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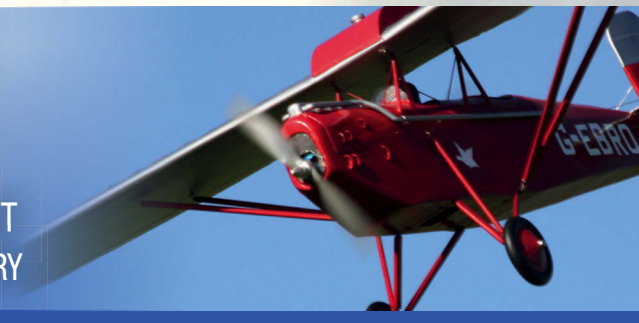

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ON THE COVER

Deserving of more attention from scale Waebird enthusiasts, the Tony Nijkuis Designs kit of the Hawker Typhoon is a good way to get a scale model of the 'Tiffie' into the air. Ken Sheppard reviews the kit in this issue.

OCTOBER 2017 NO.215

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This month's issue has a fair bit do this with models of aircraft from that ill-defined period of aviation known as the *'Golden Age'*. Although no one seams to define the starting dateof the 'lucky strike' or when the mine ran out, it is generally accepted that it all began soon after WW1 and ran out at the time of the start of WW2. From thereon, aircraft design quickly progressed to a mass-industrial scale and Aviation developed at a hitherto unimagined pace.

The demands of WW1 gave its own impetus to aircraft development, but when it ended, the rapid stagnation that ensued, many with an ambition to 'get involved' had little o go on, which led to one-off 'personal flying machines' and aircraft build in very small numbers.

One such example is the Stahlwerk series and a toll of the Web reveals some very quaint looking variants, of which Peter Rake's Free Plan feature the month is one.

Another, with a more robust pedigree is the Westland Widgeon, an aircraft from that era much modelled by aeromodellers everywhere for Indoor and outdoor free flight and for radio control. Philip Kent has long been a great exponent and designer of non-warbird scale models and our other construction feature this month presents Phil's own rendition of this aircraft at a handing 58" wingspan, convenient for transporting to the flying field in one piece and with equally convenient electric power.

Of an entirely different era, the Hawker Typhoon is a full-on warbird that deserves rather more attention than it seems to receive from scale modellers. In this issue, Ken Sheppard builds the *Tony Nijhuis Designs* kit for a 62" wingspan model of this impressively brutal looking fighter which on landing approach, with its huge chin cowl and wide main undercarriage with big U/C doors, looks rather like Popeye on steroids!

Mind you, there was pre-test fight panic when Ken check-weighed the test mode on his bathroom scales, which gave a reading of 14 lbs - rather more that the target weight of half that figure. However, it was soon panic-over when Ken eventually weighed himself, proving the requirement for a battery change for the bathroom scales - but not before there had been a panic e-mail to Tony Nijhuis asking how he had got the prototype model down to 7 lbs. The review model actually weighed in at just 4 0zs more that the prototype.

However, Ken's all-up-weight, even with a new battery in the scales, remains a closely guarded secret!

Hope you like the 'Monthly Miracle '- as the late Ronnie Moulton used to call every successive issue of AeroModeller!

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COSFORD DELIVERS!

Tom Daly's fat foto report of the UKs biggest 'buidl- it-yourself'feastival of scale excellence

Brain Rawcliffe's superb Moki 150 radial powered Hawker Tempest Mk.II.

The dodgy British summer limped on. Even Mega-Cosford suffered poor light and the odd drenching, but 2017 was still a smashing show. You could say that nothing can touch LMA Cosford for sheer size. After all, it is the largest event on the scale calendar, and the largest UK event devoted to hand-built model aircraft.

Damp, but nice

Heavy rain threatened all day. However, oddly enough, there was but one big downpour, and that was all over in less than fifteen minutes. The upside of the rain and gloom was that many of the models battling in against the elements looked positively heroic. God bless high-visibility landing lights, says I.

Afterwards, the daylight was a bit dim, but the quality of the show was superb. There are never any gaps or longeurs at LMA Cosford. They like to keep the kettle boiling. Engines are being cranked in the pits, flightlines are full and models are queueing up to fly at all times. During the day, the wind was variable and shifted to a cross-wind, which foxed a few pilots, but there were no big upsets.

One big Fokker

These days when everything seems possible, one gets a bit blasé about large models. Mind you, occasionally your paradigms are challenged. How about a Fokker Dreidecker built to a whopping 65% scale? How about a homebrew 550cc petrol engine to power it? Well this what Steve Carr has done, and she flies a treat.

Steve Carr's fantastic 65% scale Fokker DRI Dreidecker. The pilot really does look like Steve.

Dawn Patrol UK put on their usual huge display of 1/3rd scale WWI models.

Westland Lysander on short finals in the driving rain: 1/5th scale, six cylinder radial power.

Grumman F3F-2 on approach with superb undercarriage detailing.

John Townsend's refurbished Miles Magister is huge and flies a treat.

Steve Holland flew his huge Tony Nijhuis Designs North American OV-10 Bronco.

The big Fokker Dr.1 was airborne in less than twenty paces, and could fly oh so s-l-o-w-l-y. Steve built the engine himself using some commercial parts. To these he added his own-design crankcase, crankshaft, manifolds, and exhausts. He then fitted the engine with electronic ignition. It performed beautifully, with a very smooth power delivery. The noise is fabulous!

Besides this Hun Wonder, Steve also flew his 55% Yak 54. He built this from the *Pilot* R/C kit. She is 180" span, weighs 138lbs, and sports a 550cc boxer engine driving a Biela 43"x16" prop. One wonders how Steve will top such modelling achievements, but he will...

DH Dragonfly

Having my ear to the ground, I knew that Steve Rickett was building a DH 90 Dragonfly, but when I finally saw her at Cosford I was mightily impressed. She looked absolutely right. The original was a very pretty aeroplane. Possibly the most elegant biplane airliner ever built, the DH 90 first flew in August 1935. Some DH 90s even went on to serve during WWII.

Steven's model is of all-traditional construction, and was two years in build. She spans 13 feet and is built to 30% scale. She weighs 63 lbs (28.5kgs) and is fitted with two Kolm EZ 250cc four stroke engine. Incidentally, the model is covered in *Ceconite*, a full-size commercial fabric; really made my day seeing her.

John Horne's immaculate Yak 11.

Air France Fokker

Radio controlled models of commercial jet airliners are few and far between, which is a pity since they often possess a timeless elegance. Once again, the BOAC-liveried 4.9 metre span Vickers VC-10 on show at Cosford delighted us. She is powered by 4 x Wren Supersport gas turbines, and weighs 63 kgs.

But this year, Paul Bellinger and Team added to our enjoyment by displaying their 1/5th scale Air France Regional Fokker F-70. This flew beautifully despite the rain and dreadful visibility. The model is fitted with twin PST 30 turbines.

BN-2 Islander

Phil Robertshaw (with close Ground Support as always from Ritchie Robinson) flew his new Britten-Norman BN-2 Islander. Readers will remember Phil's much-admired Heinkel III (which is being refurbished). We have also mentioned Phil's striking white Wellington bomber. Phil's Islander is built to 28% scale and spans 14 feet. It is powered by 2 x 3W 60 petrol engines, and weighs 40 kgs.

The Islander remains a very sucessful British-designed aircraft. In fact, Islanders have been in continuous production for more than 50 years. More than 750 have been built so far, although many were built in Romania, and sadly not in the UK.

Yaketty Yak

Noted designer Mike Booth and his flying pal John Horne have gone Yak-Mad. Mike flew his inline-engined Yak 3, and John flew his radial-engined Yak 11. Both designed by Michael, these model aircraft are both finished to an enviable standard. They flew faultlessly, though the pilots should have had matching hats!

US schemed Spitfire

Stewart Clifford was flying his Spitfire Mk.XI. This was is in a little seen American scheme which looks strange to some at first glance. Sadly, this ace Spit suffered some structural harm on landing, sustaining particular damage to the wing. The FOD Team quickly gathered the debris.

Stewart never lets the grass grow. He will have completed his repairs by the time you read this.

Pitts Challenger

Robbie Skipton and his Dad have been busy. Robbie designs, builds, and markets his own line of CAD and CNC-d scale kits. His huge new 65% scale Pitts Challenger is the latest. She spans 3 metres. The Pitts is designed for ZDZ 250cc petrol power or similar power. Robbie has fitted a great smoke system too. Since our Robbie is a hugely capable show pilot, he gave the model a thorough aerobatic thrashing. This Pitts looks stunning in the air. Check out his *Skip Model Designs* website for more details:

http://www.skipmodeldesigns.co.uk/product/65-pitts-challenger-2/

Killer Klemm 25

John Greenfield demonstrated his massive scratch-built Klemm monoplane.

Steve Carr has fitted pyrotechnics to his 65% scale Fokker DRI Dreidecker.

Dave Johnson once again flew the majestic Vulcan XH-558.

LMA Public Relations Supremo James Ladell flew his well known Chippie.

Elegant BOAC-liveried 4.9 metre span Vickers VC-10, powered by 4xWren Superpsort gas turbines, and weighs 63 kgs.

Claude Smith's 40% scale, 3.96 metre span Dart Pup. 3W 80cc twin petrol power.

Mike Booth's Yakolev YAK 3 on short finals.

Steve Rickett's fabulous Douglas Boston III on a full-flap, gear-down pass for the camera.

Phil Robertshaw's Britten-Norman BN-2 Islander, 14 foot span, with 2 x 3W 60 petrol engines.

Dave Johnson flew this 4.1 metre span twin-turbine EE Lightning. Twin Jetcat P120s, weighs 88lbs.

Robbie Skipton's new Pitts Challenger II, from his own kit.

'The Bishops' 'Reds Duo" matching BAe Hawks.

Pushing through the gloom, Paul Bellinger and team flew this 1/5th scale Air France Regional Fokker 70.

Richard Rawle's magnificent twin canopy Carolyn Grace Spitfire T.Mk.IX.

Steve Rickett's 30% own-design DH90 Dragonfly. Twin Kolm EZ 250cc power.

This is a superbly crafted model aircraft; the woodwork alone is incredible. You may not see another for a while, since this one is built to 1/2 scale. This works out to a span of 256" (6.5 m) and a weight of 121 lbs (55kgs).

Power is delivered by a stunning Valachi 420cc five-cylinder petrol radial engine driving a 40"x20" prop. With this power available and in John's capable hands, she is very aerobatic, too. The Ghost Squadron's industrious Al Carter still provides the Klemm's full technical Ground Support.

Yet another big Fokker

Once again genial German visitor Gerhard Reinsch's flew his huge,1:2.5 scale / 4 metre span Fokker E.III. Readers will remember that this very complete and technically accomplished kit, was designed by the illustrious Paolo Severin.

The airframe is astoundingly tough, and posseses a faithfully-executed metal construction. As per the full-size example, it employs wing warping, and therefore has no ailerons. The efficiency of the wing warping on this model has to be seen to be appreciated.

Gerhard has fitted a Vallach 120cc petrol engine, which is an outstanding power plant. The melifluous sound would restore Beethoven's lost hearing. A truly

LMA Cosford has all you might expect, including a big Trade presence.

Phil Robertshaw (aided of course by Ritchie Robinson) flew his Vickers Armstrong Wellington in the driving rain.

splendid timbre.

This strong airframe has both the power and the manoeuvrability to exceed the performance of the full-size example. This particular Eindecker model is suprisingly aerobatic. Gerhard has a few party tricks. In one, he takes her to the proverbial 'great height' and then dives her vertically under power. At the last possible second, he pulls her sharply out zero-feet from the ground, in the tightest quarter-loop you will ever see. You expect destruction, but she flies on unperturbed.

Round Up

As well as being the annual large scale beano, LMA Cosford remains the showpiece of the 'build-it-yourself' model cult. Even if, like me, you tend to build smaller models, LMA Cosford is still an important annual pilgrimage. This year's range of models was remarkable and I am always astounded how the LMA manage it. The display is always slick and continuous too. In addition, the Trade presence is always extensive and impressive. This year I saw many modellers hauling huge kit boxes to their cars.

Finally, the Cosford Museum entrance is free as part of your ticket price. So, even if the rain sets in early, there is still much for families to see and do. (All the successful UK shows have long-since recognised this family connection). True, we could have done with a bit more sun, but we avoided rust and 2017 was still a Great Cosford! ■

Reds Duo BAe Hawk skimming the tarmac.

Gerhard Reinsch's Paolo Severin designed 1:2.5 scale / 4 metre span Fokker EIII.

John Greenfield's Klemm spans 256" (6.5 m).

Paul Needham's DB8, pottering by, with smoke on.

Robbie Skipton and Dad Bert with their new Pitts Challenger kit.

As usual, LMA Cosford is heavily attended, rain or shine.

STAHLWERK

PART 1: A 46" span, easy to build and fly, electric powered model designed by Peter Rake

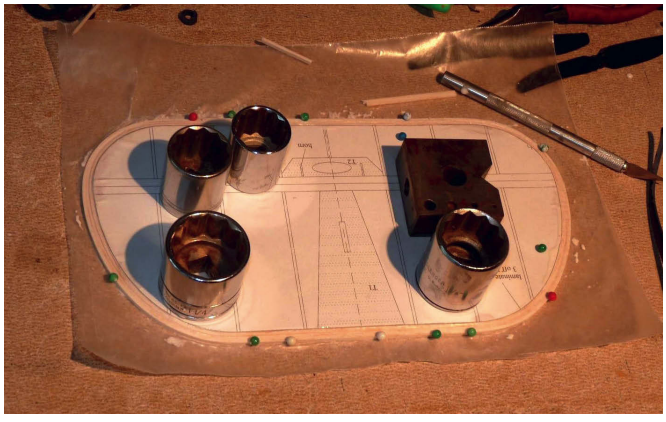
The Stahlwerk was an early post-WW1 aircraft designed to be inexpensive and use a relatively low powered engine. That is pretty much where any similarity between variants ends. It appeared with both two and three cylinder engines, with and without a raised forward decking and with alternative strut arrangements. I've even seen a photo of one with totally different struts and the fuselage covered in lozenge pattern fabric. I have that one drawn up and under construction at a much smaller size; about half the size of this model.

The one thing they do all have in common is their ease of flying once scaled down and built as electric powered models. In fact, my love of the type dates from the Walt Mooney rubber powered model I built around 40 years ago. Even clumsily built and using a far from optimal prop the 15" span model regularly turned in flights approaching 30 seconds as it flitted gently around our local cricket field. That model was followed by a 45" version based on the Walt Mooney plan, followed by a 30" span version of the same and a 36" model based loosely on a 3 view drawing I found on line. The model you see here is the next version of the 36" model, enlarged to 46" span and intended for small, cheap outrunner motor power. It retains the style of the smaller model, including being just three function control. These models fly so nicely in that form that I've never really felt the need to add ailerons. However, they are indicated on the plan so it's an easy enough task to reduce the dihedral (the original had none) and build the wings with ailerons should you so desire.

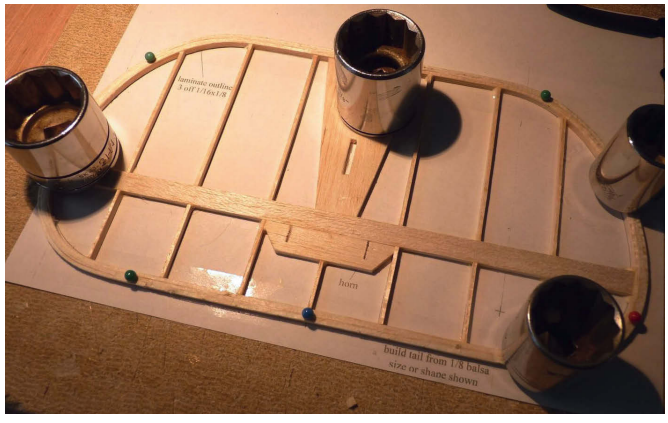
THE MODEL

As you can see from the plan there is nothing overly complicated about building this model. It's all pretty much

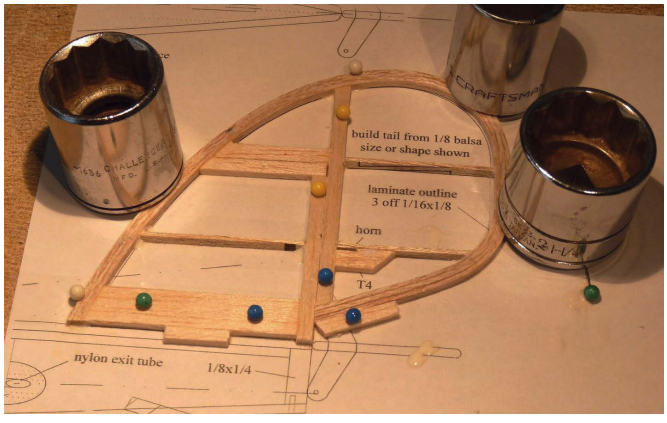
The model cruises by in a low pass for the camera. It is stable and relatively easy to fly.



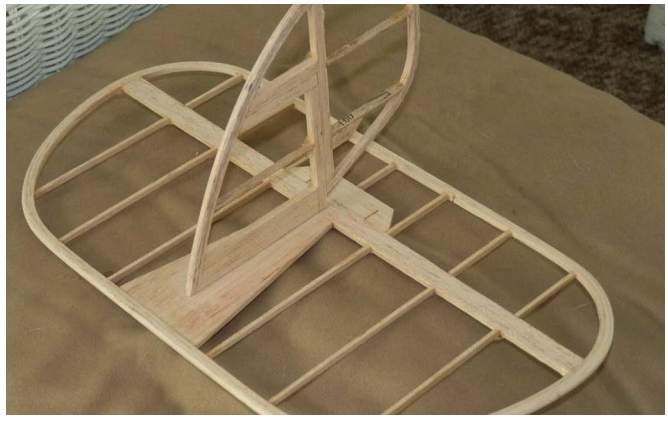
The tailplane outline being formed. Note the alternative method to that mentioned in the text. This easiest done as tailplane outline and elevator outline rather than a single piece.



With the outline dry the tailplane/elevator assembly is very straightforward.



The fin and rudder follow a similar process.



All sanded and with the edges rounded off the tail surfaces are test assembled. Control surfaces are yet to be separated.

traditional aeromodelling as far as the basic structures are concerned. As regards specific points such as struts, wheels and laminated outlines, lets take a little closer look at those areas.

The main struts are definitely more than just cosmetic, although the diagonal, carbon fibre struts are only cosmetic and may safely be omitted. With the inverted vee-style centre section struts, the wing struts HAVE to work for a living. That said, unless you are flying the model well outside the design parameters, they only have to work in compression, not tension. If one wing can't move downwards because of the strut, the other wing can't move upwards to put any tension on the opposite strut. That makes those simple glued-in pieces of wire at each end more than adequate. By gluing them into both fuselage side and wing we take care of the minimum loads placed on the model during normal flight, and even during the odd loop, while the compressive resistance of the struts themselves prevent the wings wobbling on the inverted vee struts.

So, no matter how crude the split pins glued into the centre section and simple strut ends appear, they do work well provided they have been epoxied into place. Use something as potentially brittle as CA and you may be making a rod for your own back.

Whilst it is perfectly viable to use commercial wheels on the model (spoked wheels always look nice) don't discount the built up wheels shown on the plan. Let's face it, having bought the laser cut parts you already have most of the bits to hand. Card for the cones is cheap enough and sponge rubber can readily be obtained on line. They are adequately strong for much heavier models than this one and are about as cheap as scale type wheels come.

Now for the real bugbear for some people; laminated outlines. I find them a simple, strong and lightweight method of producing thin flying surfaces, but I know many people have trouble with them. That being the case, maybe it's worth taking a look at how I do it.

Begin by making templates of the surfaces concerned, taking the inner edge as your reference. These templates can be anything you like really, Depron, balsa or thick card; just as long as they are at least as thick as the wood you're going to be shaping around them. Then either tape or wax (rub with a candle) the edges to prevent the laminations sticking to them. Pin them down to a polythene sheet covered board and set about preparing the strips you'll be laminating.

The wood you use for the laminations doesn't need to be particularly hard. In fact, medium grade wood is perfectly adequate since they will gain a lot of strength from the actual laminating process. The only other point I would make about the wood you use concerns thickness. If you find you're having trouble getting 1/16" balsa that will take up the curves well, use twice the number of strips of 1/32" balsa. Cut the strips over-length and dump them all in a bowl full of warm water, weighted down to ensure they all get thoroughly soaked.

While these are soaking, make yourself a set of waxed pieces of scrap balsa with which to hold the laminated strips tightly against the templates you made previously.

Once the soaked strips are nice and floppy, glue together (white woodwork glue, not CA) the required number and use one of the scrap pieces to secure them at one end of the template (press it firmly against them and pin it to the board).

Now we come to the important bit. Put some tension on the laminated strips and PULL them into place around the template using the scrap pieces to

Although detail is minimal the result is still a very attractive model

secure them at regular intervals. It's important that you pull them round, rather than pushing them into place because it drastically reduces the risk of cracking any of the strips. It's the fact that they are continuous lengths that gives laminated outlines their strength, so cracked strips are always going to be a week spot in the structure. For much the same reason, it is important that the strips are glued together securely, with no gaps between them. Allow the laminated outlines to dry completely before removing them from the board.

All that remains now is to pin the outlines over the plan (but not with the pins pushed through them) and build the tail surfaces in the usual manner.

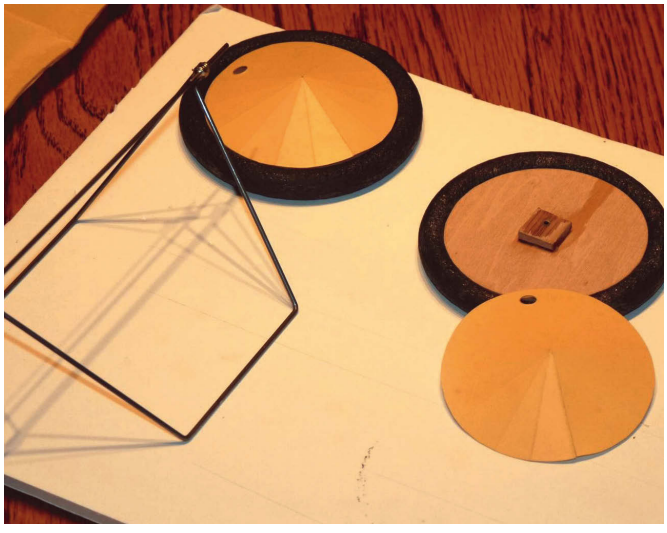
Now, with that fully explained, I suppose that would be as good a place as any to begin the actual construction of the model itself.

TAIL SURFACES

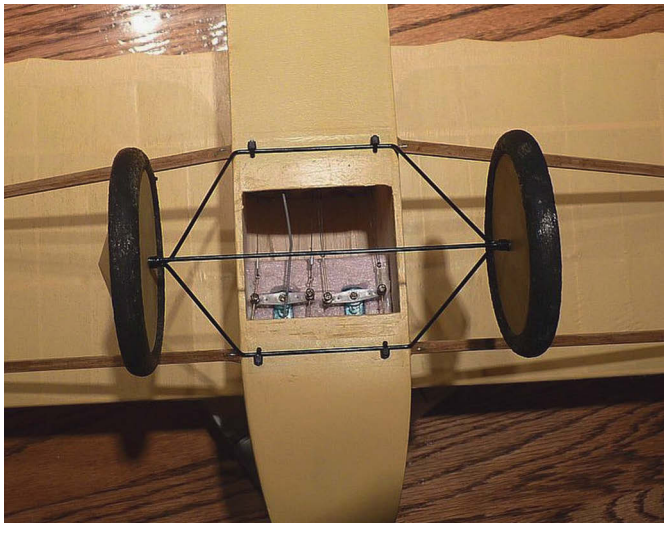
Although the description of creating the laminated outlines took rather a lot of explaining, actually building the tail surfaces really is simplicity itself.

For the tailplane and elevator, try not to make the tailplane trailing edge and

CONSTRUCTION



A shot showing the ready assembled u/c, wheels and the dreaded card cone that took so long to describe. Effective looking, aren't they?



Just how tidy the underside can look if the landing gear is fitted after the lower fuselage is covered.

elevator leading edge too hard. They need to be firm enough that they don't distort or break easily, but you also need to be able to slot them accurately to take the hinge strip without splitting. Test a few bits of strip for stiffness and their ability to be slotted before deciding which pieces are best suited to the task. It's just a case that, apart from the outline, those are the only pieces that carry the spanwise loads, so they need to be strong enough for that, but no stronger than strong enough.

Pin down the outline over the plan, remembering what I said about not pushing pins through your carefully laminated outlines and glue in the 1/8"x1/4" strips that will form the trailing edge/leading edge we've just been discussing. Glue in parts T1 and T2 and follow those with the 1/16"x1/8" balsa 'ribs'. Allow to dry completely before removing from the board. Sand overall and round off the outer edges and the elevator leading edge. Unless you absolutely love covering around bits sticking out I'd suggest that the control horns aren't fitted until after covering is complete.

The fin and rudder follow much the same process but the fin trailing edge/rudder leading edge don't need to be as hard as those used for the tailplane/elevator. There is very little stress on these parts, so medium balsa is fine.

LANDING GEAR

I would strongly suggest that you assemble the undercarriage legs before binding them to the fuselage. Since there is soldering to be done, there's nothing worse than dropping a blob of hot solder onto a covered fuselage. The hole it leaves will do nothing to improve the appearance of the finished model. I say covered fuselage, but the only areas that really need to be covered before the u/c is bound in place are those to which the u/c will actually attach - the forward lower fuselage. I strongly recommend this because it will result in a much neater appearance than attempting to cover over/around the already fitted landing gear.

So, begin by marking the exact position of the u/c legs onto the plan view and temporarily secure the legs accurately over those marks. Bring the leg ends together with the axle and bind them using fine copper wire (stripped from electrical cable) and solder the joints.

The wheels are made by gluing together the balsa core and ply outer parts. Use a slow drying glue that will soak into the wood for a stronger joint and alternate the grain direction on the parts to remove the risk of a weak spot caused by matched grain direction. Use the bearing tube to ensure accurate alignment of the parts and clamp these together while the glue dries. Epoxy the doubler and bearing tube in place.

Tyres are made from smooth coated foam rubber available from many sources on line. Make sure you cut it with a sharp knife to obtain square, smooth ends and then join using CA. They need to be a snug fit on the wheels, but not stretched at all. Stretching will just put stress on the join and cause the edges to curl apart. Use something like contact adhesive to glue the tyres onto the rim. Run a bead of glue around the centre of the rim and ease the tyre into place. They don't have to be glued but it's quite embarrassing when one comes off during take-off.

The card cones are actually probably the most technical part of the entire wheel. It isn't that they're difficult to make, just that it takes a little working out to get the diameter right in the first place. Draw up an accurately measured sketch showing the radius of the wheel outer and how much angle there will be on the cone (how far you want it to stand out). The line between the apex of the cone and the edge of the wheel outer is the radius you need to use for marking out the cone disc. If I remember, I'll include a drawing with this article (its on the plan), but it's useful to know how to do it for other sizes of wheel.

Once you have the disc of card (postcard or similar) score into it the spoke lines. 8 evenly spaced lines running through the centre point results in 16 spokes and that looks about right. Do the marking using a ball pen and with the disc on a magazine so that it will raise the lines on the opposite side of the disc, thus representing the spokes on the outside of the cone.

Cut out one section between the 'spokes' and then crease the cone along each spoke mark so that it forms a cone before gluing the ends together. You can then add valve holes and axle end if desired. Don't glue the cones to the wheels until the wheels are fitted to the axle. It's awfully complicated trying to solder a washer onto the axle if there's a lump of postcard in the way.

Well, with the minor assemblies detailed, and hopefully a few tips passed on, it's time to end this part of the construction article. Next month will see the main components built, the assembly and the all important flying get dealt with. ■

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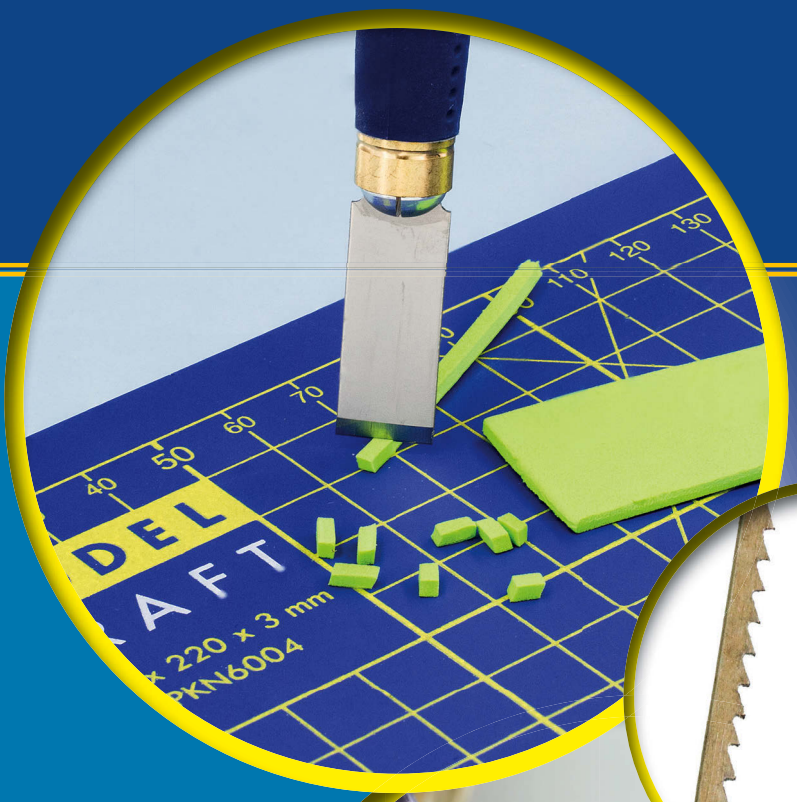

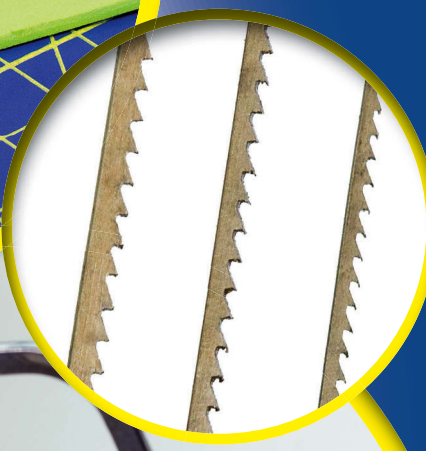

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TAKE THE PLUNGE!

MOULDING PLASTIC TO CREATE A VARIETY OF SCALE FEATURES IS REALLY VERY SIMPLE. HERE, JOHN CARPENTER DESCRIBES THE PRODUCTION OF A COCKPIT CANOPY USING THE 'PLUNGE' METHOD

A careful look at almost any aircraft built since the early nineteen-twenties will quickly reveal that glass and plastic moulding of material for such things as navigation light covers, canopies and inspection panels was being introduced. As the years passed, more and more such moulded shapes began to be included as streamlining and fairings over protuberances became ever more important in the quest for airframe drag reduction. At this point, the need for a technique to mould plastic to reproduce cockpit canopies and myriad surface fairing humps and bumps to get the required three-dimensional shape for our models becomes clear. For most of us, that technique needs to be a simple one.

The technique of 'push' or 'pull' moulding has been around for many years and is far easier to do than is generally appreciated. No sophisticated machinery is actually needed. Indeed the use of some pretty crude bits and pieces can produce entirely satisfactory results.

START HERE

Let's take a look at a few simple and not-so-simple shapes and see what can be done. The first thing to do is to take a long hard look at the canopy shape you require. In many cases the full-size canopy is made up of a metal framework to which clear panels are attached. Most of these panels will be flat sheets, or curved only in one direction. There may be only a couple of areas where the glazing curves in three directions and as a result a moulded segment is required.

Taking the Percival Provost (one of my previous scale projects) as an example, the canopy initially looks quite complex, but can be dealt with in three parts: windscreen, sliding section and rear, as made for the full-size aircraft (**photo 1**). The only three-dimensionally curved areas are the top to the sliding section and the 'eyebrow' windows at the top of the windscreen (**photo 2**). All the others are either flat or only curved in two directions and can hence be cut from sheet material and fitted to a framework (**photo 3**).

Both of these parts are relatively easy to make using the well known 'plunge' method of forming. This involves making up a balsa former to the shape required and a ply base plate with a hole in it (cut to the outline shape of the required component) through which the former can be pushed. Clear plastic material is then fixed to the base plate and heat applied to soften the plastic. Once the plastic has become 'plastic', if you see what I mean, then the former is firmly pushed into the hole in the former, moulding the hot material to the required shape as it goes. Once cooled, the parts are separated and the plastic is trimmed to shape and fitted to the framework.

OTHER BUMPY BITS

Photos 4, 5, 6 and **6a** show the technique being applied to a smaller moulding, in this case an engine cooling inlet. You will notice that the ply base plate is placed on a couple of house bricks with a gap between them to permit the plunge in the gap. No high-tech approach required here!

Heat is applied by a heat gun until the plastic is very soft, and that is the trick! The plastic must be very hot and it might take a couple of tries to establish the temperature required. When you have it just right, the former will sink in with little pressure. Have it wrong and you just get a dent! No problem, just reheat and try again.

In the case of my Provost, the sliding section top was made in two parts because, rather helpfully, the aircraft has a frame along the top centre which means that two smaller formers can be used rather than one big one. I find this easier to work on and mould (**photo 7**).

INTERNAL STRUCTURE

I have found that the easiest way to make the internal canopy framework is to build it from ply in small sections, actually on the fuselage as that way it is easy to see if the shape is, shall we say, at variance to that desired. The moulding formers are built up from 13mm sheet balsa and can be placed on the framework to check the shape and then removed for finishing.

Small formers, such as wing tip navigation lamp covers, can be used without further finishing so long as they are smooth. (**Photo 8**). Larger ones benefit from a couple of coats of finishing resin, sanded to a fine finish. This will withstand several goes at 'plunging' if necessary, provided that the former plug is allowed to cool a bit between uses. Any sharp edges will need to be reinforced with thin ply to withstand the 'plunge' pressure, which might otherwise distort them. Note that the moulding formers do not themselves incorporate any representation of the framework.

Adding canopy framework at this stage does not really work too well, at least not for me, and I add the final outer framework after the canopy is complete. We will return to that aspect later.

THE FINER POINTS

A few further points here might be of assistance. The plunge method is best used where the base plate can be laid flat and heat applied to it from a heat gun. For larger moulding jobs a heat gun is not really man enough and in this case I find it better to fit the former into a vice on some form of stand-off and heat the plastic and base plate separately. Once the plastic is hot enough, the base plate is plunged over the former. In effect, the same process but the other way round.

A further alternative that I have used is to dispense with the base plate in favour of a couple of wood battens, tacked one to each end of a sheet of plastic. The battens serve as handholds when heating the plastic and pulling it down over the former. This alternative is best for larger jobs.

I normally use plastic sheet obtained from my local model shop. For most small jobs and where there is no great depth to the plunge I use 15 thou. material and leave a good area of plastic around the base plate hole to provide material for the stretch. For larger jobs, or those that have a deep plunge, a thicker material provides more stretch for the process. You will know you have used the wrong one when a normal plunge to the required depth results in a moulding too thin for practical use!

I use an electric fire, oven gloves and a great deal of care in these circumstances. If you try this approach, be aware that hot plastic can melt, electric fires are hot and oven gloves are not actually fireproof! (Guess how I know this). I hope the message is clear.

Once the canopy, nav. light cover, gun turret or whatever is moulded and fitted, I make up the final outer framework from thin strips of self-adhesive metal foil (obtainable from car shops) or thin lithoplate fixed with impact adhesive. Add rivet detail and paint to taste, weather the metalwork and job done! (**Photo 9**).

Whilst the process is really quite easy, it would probably be best to start with a few smaller parts until you get the feel of the job. Larger and more deeply moulded parts do take a little experience and practise, but are quite possible.

Give it a go - you may surprise yourself. ■


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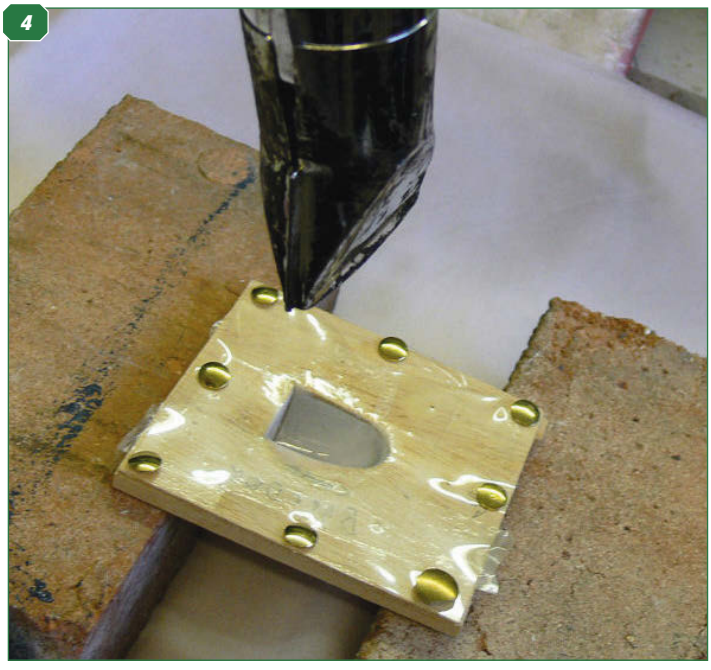
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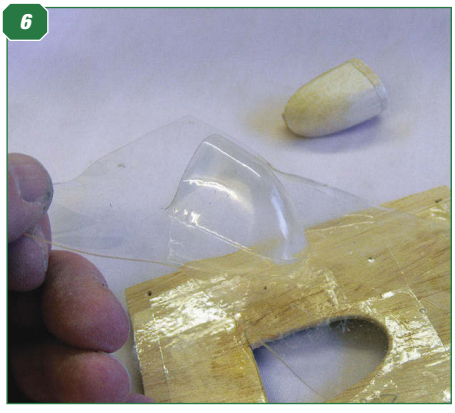
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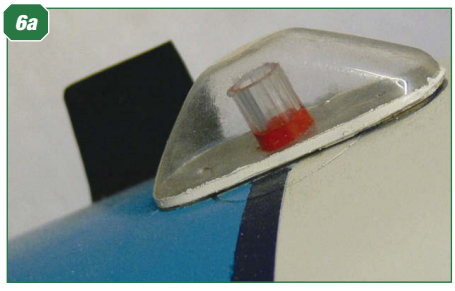
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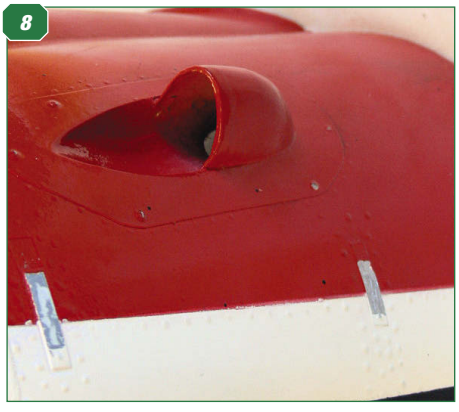
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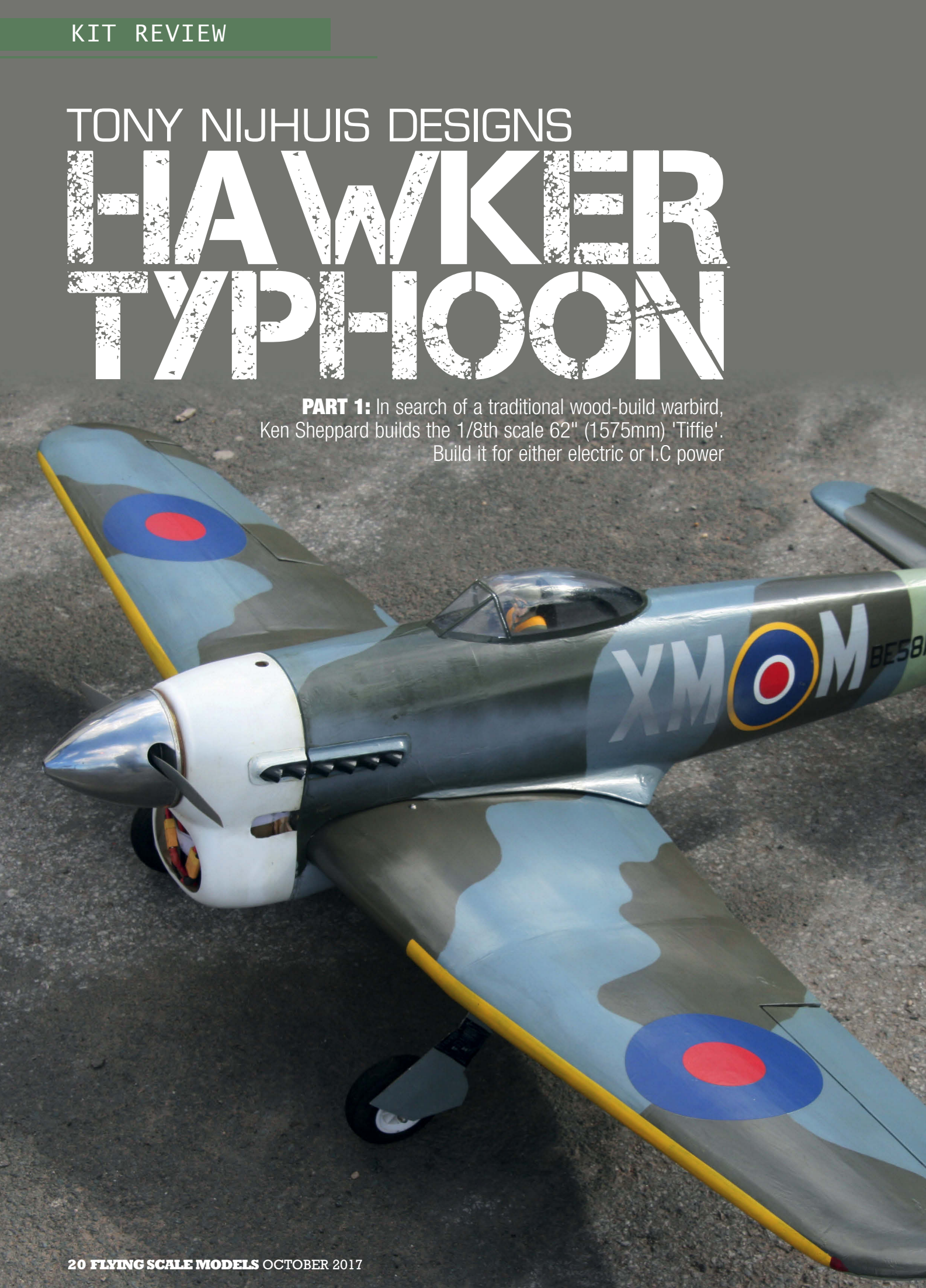
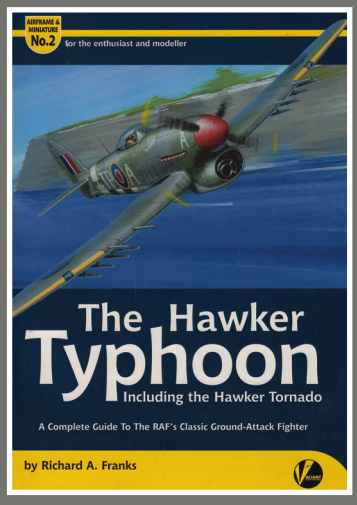
TONY NIJHUIS DESIGNS HAWKER TYPHOON

PART 1: In search of a traditional wood-build warbird, Ken Sheppard builds the 1/8th scale 62" (1575mm) 'Tiffie'. Build it for either electric or I.C power





Good reference source - Richard Franks' book for enthusiasts and modellers.

The Hawker Typhoon (the 'Tiffie' in RAF popular terminology) was a British single-seat fighter-bomber, produced by Hawker Aircraft, introduced into service in late 1941. It was intended to be a medium-high altitude interceptor, as a replacement for the Hawker Hurricane, but several design problems were encountered and it never completely satisfied this requirement.

The Typhoon was originally designed to mount twelve 0.303" (7.7 mm) Browning machine guns and to be powered by the latest 2,000hp engines, but its service introduction was plagued with problems and for several months the aircraft faced a doubtful future. However, when the Luftwaffe introduce the Focke-Wulf Fw 190 into service in 1941, the Typhoon was the only RAF fighter capable of catching it at low altitudes; as a result it secured a new role, initially as a low-altitude interceptor.

It later became established in roles such as night-time intruder and long-range fighter, and from late 1942, the Typhoon was equipped with bombs and from late 1943, RP-3 ground attack rockets were added to its armoury. With those weapons and its four 20mm Hispano cannon, the Typhoon became one of the Second World War's most successful ground-attack aircraft.

The Hawker Typhoon has always been on my 'one day' to-build list. It is an aircraft that looks exactly like what it was originally designed for - a tough, pugnacious fighting machine with smooth Hawker lines and that distinctive chin radiator cowling sets it apart from other classic British WW2 fighters - it looks the perfect ground strike aircraft, which was exactly as it performed, and as such, attracts a lot of interest from scale R/C modellers.

Before starting any of my scale builds (unless it's an ARTF) I usually do a bit of research on the different Marks of the type, identify distinctive detailing and start to think about a colour scheme. This model was no different and I looked no further than the excellent Richard A Franks book *'The Hawker Typhoon Including the Hawker Tornado'*, available in the *'Airframe in Miniature'* series, book No.2, published by Valiant Wings Publishing (available from Doolittle Media) which, although primarily aimed at the plastic modeller, contains all the info and detail you will need to produce an authentic-looking 1/8th scale replica.

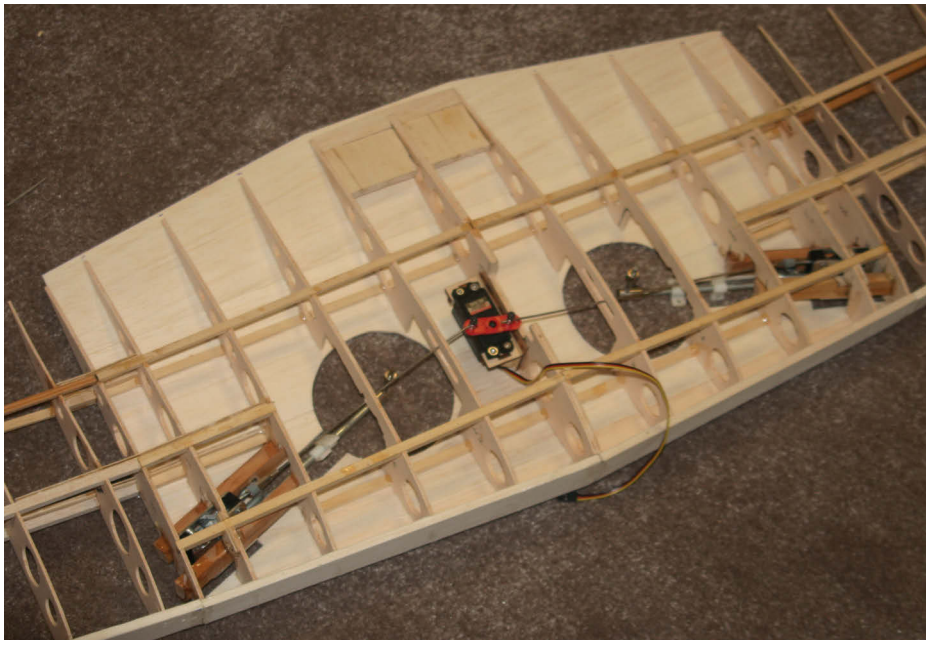
As already indicated, this review is in two parts, the second being next month. In the first part here I will cover the basic build up to and including equipment installation, leaving the finishing and flying for Part 2.

POWERPLANT AND OTHER CONSIDERATIONS

One thing that might be considered a drawback by would-be builder is the short nose moment of the type, caused by the massive weight of the huge engine that powered the full-size beast. Tony Nijhuis has kept to scale with his design, unlike several ARTF versions of the aircraft from the Far East that have stretched the nose moment considerably, losing, along the way in my opinion, the 'pugnacious' look of the true short nose.

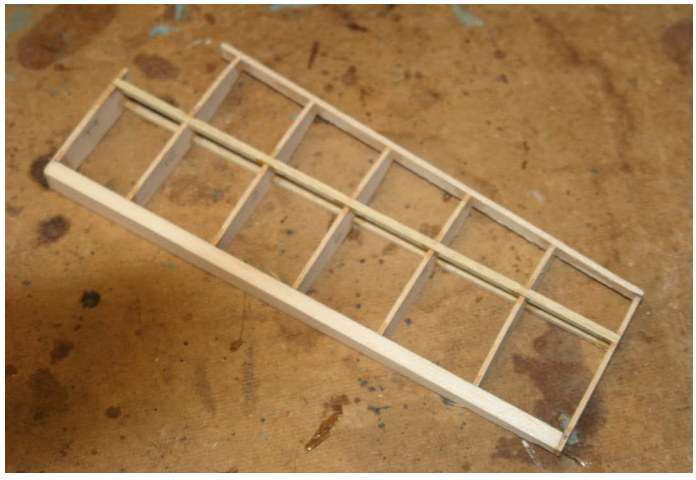
The result, of course, is that nose weight will be needed, together with the absolute necessity of a very light tail end to minimise the nose ballast required to achieve the correct fore/aft balance. I knew this would be the case from the start, and despite the 2 x 4S power packs being placed *vertically* and as far forward in the cowl as possible I needed quite a bit of lead up front to balance the model. However, the model still came in at close to the 7lb. target that TND quote - actually tipping the scale at a very acceptable 7lb. 4oz.

I admit that I tend to be a 'heavy' builder, so if you make every effort to keep the tail end as light as you can, selecting the lightest grade wood and keeping detail finishing to a minimum, even with the lead necessary to get the CG as advised, you should have no problem in reaching the same target weight. This should give a very spritely performance (don't want to give too much away until you've read Part 2 next



The wing centre section with mechanical retracts, servo and linkage fitted. Outer panels also attached.

Lower wing sheeting complete starboard side, showing aileron and servo mounting plate. Note also piece of string taped in place to allow servo lead to be drawn through after covering/finishing.



One of the tailplane halves first stage assembly before skinning.

month!), as the wing loading will be just about right for this type of fighter.

Another consideration is the powerplant - and type of power! TND advocate electric power, but suggest a .61 four-stroke IC motor would also be suitable. I have actually tried both, first fitting an O.S. 70FS engine and then retro fitting an equivalent sized outrunner - an E-Flite Power 46 (670kv). Both are very suitable, but both installations need careful consideration due to the short nose.

In retrospect, when planning the IC installation, I neglected to consider access to the fuel tank which, if built to the plan, can only be accessed from the wing cut-out with the wing off. In the event of a plumbing problem for example, this causes difficulties at the field, where a top hatch in front of the canopy would have been a very good idea.

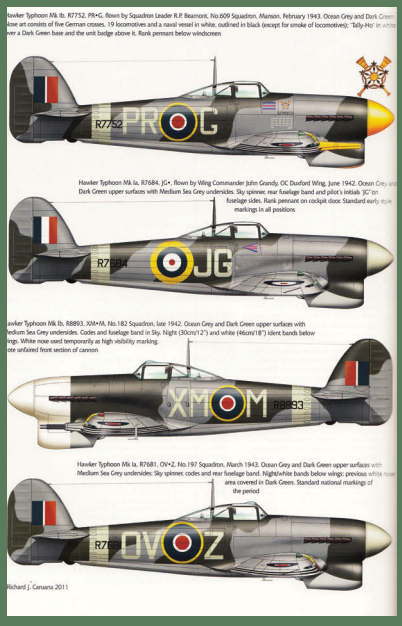
I didn't plan a hatch and as Sod's Law dictates, had plumbing problems when it came to running the engine. The carb was so far back into the tank bay than the fuel lines became kinked - and so I recommend fitting a top hatch if going the IC route! Noseweight is still required, however, but there is plenty of room for it under the engine inside that cavernous cowl!

The electric installation needs thought, too, regarding fitting and removing the Lipo packs for charging (never charge Lipos whilst onboard the aircraft, if you value your model!). Again, placing the packs as far forward for balance purposes means connectors may be difficult to access - and you don't want to have to remove the spinner, prop and cowl each time you want to connect/disconnect the flight packs. Tony suggests haveing two packs in there - the second one for ballast, as the flight duration on one single 3,700mAh pack should be sufficient, but connect two with a parallel lead and you've got double the capacity, although also two packs to connect.

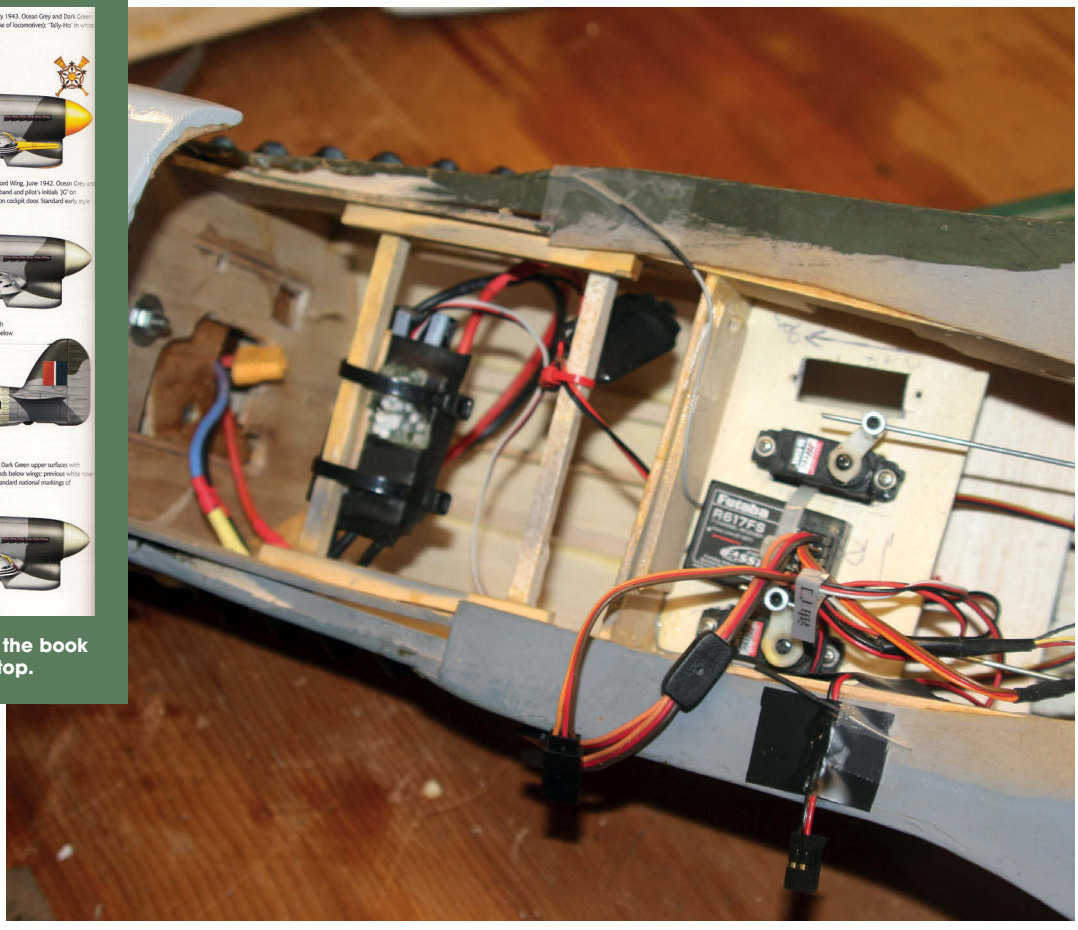
The photos show the EP arrangement I

A view of the firewall with the original IC mounting system. Note large hole in firewall to clear the rear-mounted carburettor on the four-stroke engine. Note also the thin, profiled former fitted to firewall to positively locate the cowl (see main text).

A view of the completed cowl, showing the inset former glued in place, the retaining screw holes and the thick balsa sheet fitted in the bottom to strengthen the cowl - in the case of noseovers!



Samples of colour schemes in the book - the one selected is 3rd from top.



A view of the wing seat showing the radio installation. The ESC is attached to one of the obsolete IC tank support crosspieces. The switch charging lead is superfluous (I hadn't removed the switch) as the radio power is regulated from the flight Lipo.

arrived at - it's tight, but possible. So, onto the build...

BUILDERS' DELIGHT

It's been quite a while since I have built this size of model from scratch using a kit. I have to say right from the start that it was a very pleasant experience - not a beginner's model, but anyone with some plan building know-how under their belt will find it straightforward and relatively easy. The plan is very clear, the cut parts fit well, the quality of the wood in the kit is exemplary and only minor alterations were made to the wing to cater for the retract units I used, needing different beam spacing of the mounting hardwood bearers.

I had a pair of mechanical retracts available from way-back that were available for use, although I would have preferred a set of electric ones , but hey, you use what you have. Being a bit weight conscious, I figured that electric units would weigh less than mechanicals when you add in the linkages and the weight of the retract servo, but I don't think there is a lot in it.

I decided to build the wing first, starting with the centre section - it has a flat lower surface, the outer panels being built individually and then joined with ply dihedral joiner plates on main and rear spars. As already mentioned, the ribs that carry the main undercarriage bearers needed to be modified slightly as the set of legs I had were slightly wider than those referred to on the plan.

Once the retracts, servo and linkages are fitted the operation should be checked to ensure that the axles are the same distance from the wing leading edge strip and at the same height when retracted. If there is slight differences, one of the legs can be tweeked to suit). The lower centre section sheeting can then be fitted and the wheel well holes cut to match the axle positions.

The outer panels are then built without the ailerons and wingtips and then attached to the centre section using the ply dihedral braces slotted into the spars behind the jointer ribs, ensuring that the dihedral at the tip rib is the same both sides. I then fitted the outer panel lower skins and fitted the aileron servos and leads cutting rectangular slots in the wing surface allowing the servos to be slipped in and a lite-ply plate glued to the inner bottom surface, either side, for the servos to sit on and be screwed in position.

Rather than leave the servos in place, I fitted a length of string in each wing half, retained with a piece of tape adjacent to the servo slot and running to the centre panel middle rib, to be accessed when the top skins had been fitted and an access hole cut. The ailerons were also made up at this stage, ready for the top sheeting.

Finally, tapered balsa squares were fitted either side of the centre rib, sanded to be flush with the tops of the centre and adjacent ribs to take the wing bolt holes and prevent the wing skins from crushing when the bolts are tightened.

The LE and TE can now be shaped to match the rib profile, in preparation for the top skins to be fitted, giving a featheredge at the TE. Thereafter, the top sheeting applied.

There is anhedral on the centre section top surface, so this is sheeted in two halves along the centreline and then each of the outer panels. The ailerons can also be sheeted and the aileron sheet LE chamfered top and bottom for centre hinging, or chamfered at the bottom only for top hinging (I chose the latter). The wing tips are carved from thick balsa sheet and I inserted a piece of 1mm ply in the trailing edge after slotting it with a saw to strengthen the tip at the aileron end.

FUSELAGE

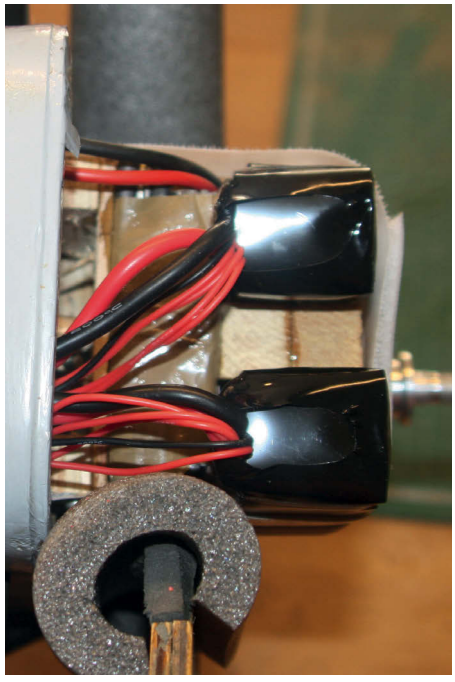
This is a very traditional build of sheet sides with lite-ply doublers across the wing seat, birch ply firewall and second frame that carries the hole for the wing locating dowel edge, plus oval lite-ply frames that carry the 1/4" square balsa stringers.

The fuselage is built using the vertical crutch system of half frames. One half is assembled first using lite-ply top and bottom keel pieces and the main centreline stringer to hold the frame halves perpendicular to the crutch pieces. This fuselage half is then lifted from the building board and the remaining frame halves and other centreline stringer added, ensuring that the keel members are perfectly straight (i.e. making sure you don't end up with a 'banana' or twisted fuselage).

> "It's not the fastest method, but providing the stringers are close and man enough to prevent the 'starved horse' effect"

The finalised EP outrunner installation with twin Lipos underneath. Note ply disc used to extend length of standoffs. Also note the battery connectors as originally configured - unsafe! (see main text).

A close up of the battery mount with wood block spacer and Velcro grip strips. Note also the significant amount of lead behind the battery mount and wrapped around the lower standoffs.



An underside view of the Lipo installation, showing revised connectors position - access now from rear of aircraft, well away from propeller.

When satisfied all is true and the glue fully set, the remaining stringers, etc. are added. Fit a cockpit floor, the wing bolt nut mounting plate and the servo tray - and start sheeting. I tend to sheet using the largest pieces that are practical for the curvature which, aft of the wing seat, become double curvature. I cut a pair of opposite panels to size, gave them a good rinse in water to make them pliable, then taped them in position before leaving to dry - whereafter the tape is removed and the panels hold their shape. These can then be trimmed to final size and glued in position.

SPECIFICATIONS

Manufacturer: TND (Tony Nijhuis Designs)
Scale: 1/8
Wingspan: 62" (1575mm)
Length: 48.5" (1232mm)
AUW: (TND target: 7lb/3.2kg) Actual weight: 7lb. 4oz.
Wing Area: 4.5sq.ft.
Wing loading: (TNM target: 24oz/sq.ft./7.2kg/sq.m)
Functions: 5 channel (mechanical retracts recommended)
Power: .61cu.in. 4-stroke glow, or AXI 4120-14 (660kv) outrunner recommended 2 x 4S x 3700Mah Lipo pack
Price: £191 (online offer saving £100) - comprises plan + vac form set + CNC pack + wood pack (other options available)
Also required: Retracts (no fixed unercarriage supplied in kit)
4" diameter spinner (if IC powered) - an optional vac formed electric spinner is available from TND
4 x mini servos
1 standard size retract servo (if using mechanical retracts)
6 channel radio of your choice
Propeller/esc/fuel tank to suit chosen powerplant

The elevator and rudder snakes were inserted and supported in several places along their length by 1/4" square balsa strip crosspieces glued to the frames and secured with small tie-wraps, exiting the fuselage sides in line with the planned horn positions. This is repeated until the fuselage is skinned completely - it's not the fastest method, but providing the stringers are close and man enough to prevent the 'starved horse' effect, the completed skin profile generally needs minimal sanding to get a perfect double curvature surface.

Lightweight filler can be used to fill any gaps if the panels don't mate perfectly (this applies to the wing and tail sheeting, too, of course). The lower part of the engine cowl chin wraps around the wing leading edge and this is fitted and shaped from laminations of thick balsa sheet, after the wing has been attached to the fuselage, using a dowel at the LE and two nylon bolts into blind nuts at the TE. The fuselage sides are carefully trimmed during this process, to ensure a good fit and that the wing is perpendicular to the vertical datum. To check this, it is a good idea to build the fin (laminated balsa sheet) onto the rear fuselage and check it is vertical and that the lower surface of the wing centre section is horizontal.

Regarding the front end, I left the fitting of the cowl until after the powertrain installation - and moved on to the tail...

TAIL SURFACES

The tailplane is built in two separate halves, with a balsa strip spar top and bottom, sheeted, then joined through a slot in the fuselage. The elevators and rudder are shown on the plan. They are built up over a sheet core and designed to be covered with thin balsa sheet.

When the wing has been fitted and checked for a good mate to the fuselage and fin, the tailplane halves can be applied and glued in place, after first inserting the wire elevator joiner at the trailing edge (check that the wire elevator arms are in the same plane when viewed from the side. If there is any difference, tweak the arms until they are exactly the same - my wire joiner was slightly out and needed this adjustment). Check the alignment of each half with the wing centre section TE - I used a strip of masking tape from the top of the fin around the tailplane tip and down to the fuselage bottom on either side, checking by eye that the tailplane halves are perfectly horizontal. Thereafter, set the fuselage aside to let the glue to dry.

The elevators are centre hinged, with top and bottom surfaces covered with thin balsa sheet - as already mentioned, I omitted these skins on elevators and rudder to save weight, although it could be said that the weight saving was minimal (but every little helps!). Dry hinge the elevators at this stage and check that the elevators line up at the neutral position - these can be adjusted later when the elevators are finally fitted and the wire arms are epoxied into the holes in the elevator core, but a check (and any correction done) at this early stage is advisable. The rudder is horn operated, so a centre chamfer of the LE is sufficient.

COWL/MOTOR INSTALLATION

This is an ABS vac-form that requires the forming flange to be cut off first. Trim it as close to the top of the base radius as possible to maximise the effective length of the cowl (making the nose as long as possible = minimum noseweight!). A ply former is supplied in the kit to be glued inside the cowl to carry the four attachment screws that hold the cowl to the firewall. I made a second identical former and glued it to the firewall to positively locate the cowl.

Fit these and the cowl, before final shaping of the fuselage skins at the nose, so that the join-line is nice and flush. Once

the cowl has been fitted and removed, the electric motor installation can commence by determining the height of stand-offs required to bring the front face of the prop driver just proud of the cowl nose ring flange.

In my installation, I glued and screwed a 1/2" ply circular former onto the firewall, which, combined with the 23mm long standoffs I had to hand, positioned the E-flite outrunner perfectly. I also shaped and glued a piece of 1/2" balsa sheet to the inside bottom of the cowl, to both give it strength in the case of a nose-over and also to stop the Lipo packs dropping down onto the cowl in the event that they come loose (a hard landing?).

I have enclosed a photo of the IC engine mounting that I configured in the first instance, showing the large hole in the firewall necessary to clear the rear-mounted carb. Other photos show the electric set-up, including the positioning of the Lipo packs and necessary nose weight.

For those who wonder what they are, the holes in the cowl shown on the photos of the completed model were to facilitate the four-stroke silencer, needle valve and glow plug access.

As an aside, to maintain the colour of the heatshrink covering used (more on this next month) without having to match the colours in enamel or acrylic (never easy), I was very pleased to see a scheme that featured a white nose in the Richard Franks book - it was in fact, an early Mk.1b Typhoon (with the car door style cockpit access hatch rather than the later sliding bubble canopy), but hey, who would notice!

So I saved some weight by not having to spray the entire aircraft, just to match the cowl! For the 'aeronerds' out there, apparently the white nose was only used temporarily for high visibility marking, according to Mr. Franks.

EQUIPMENT FIT

Having decided at first to fit an IC motor, the servo tray was located at about mid-chord of the wing cut-out, to allow the tank to be fitted. Of course, if going the EP route from the start, it would be advisable to position the tray as far forward as possible to bring the elevator and rudder servos in front of the CG. There is plenty of room above the forward positioned servo tray to allow the ESC to be located, together with a separate radio battery if required - normally I would do this, especially if mechanical retracts are used, but considering the weight of an extra battery...

In my installation, the Lipo packs also power the radio and when connected, this brings into play the one safety issue I have with my set-up (of my own making, of course) - the Lipo connectors are accessed through the chin radiator orifice in the front of the cowl, which means my hands are in the prop arc when I make the connections. This is not advisable! It means the whole system becomes live with my hands still in the prop arc. Make your arrangement differently! To follow my own advice, I have re-routed the Lipo and esc leads to pass through the chin aperture so that now, to connect/disconnect the Lipos, I put the model inverted on a support stand and connect up the leads from behind the model and behind the chin cowl.

Luckily the Y-lead that I made up for the Lipos was long enough to allow this, although I do need to use a small pair of needle nose pliers to hold the battery connector half when connecting/disconnecting. A photo hereabouts should show the revise set-up. At the field this works well - and my hands are nowhere near the prop!

Ok, that pretty well covers the build and basic gear installations, so...

In Part 2...

Preparation for covering, options for covering, finishing - and, of course, flying! ■

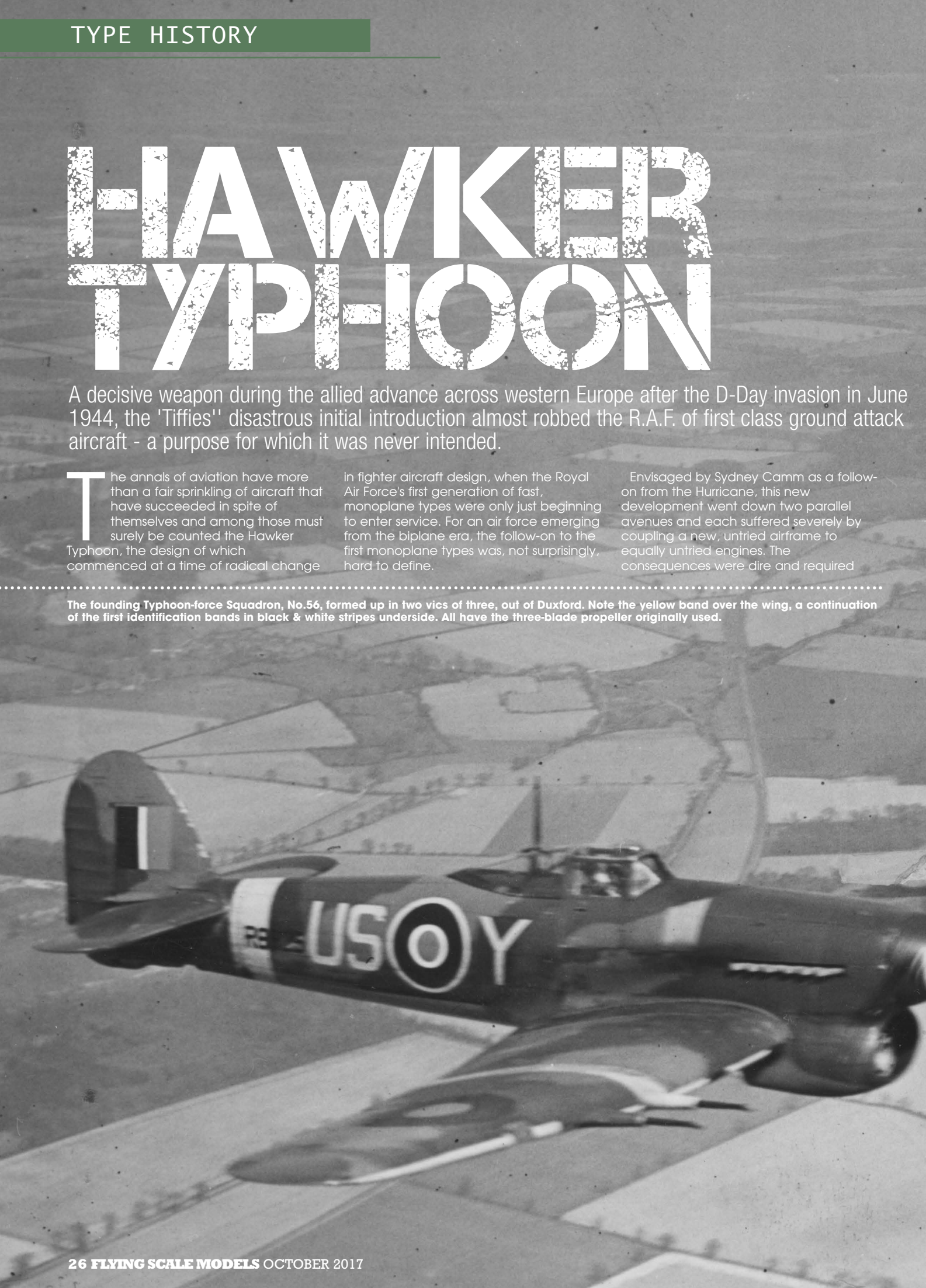
HAWKER TYPHOON

A decisive weapon during the allied advance across western Europe after the D-Day invasion in June 1944, the 'Tiffies'' disastrous initial introduction almost robbed the R.A.F. of first class ground attack aircraft - a purpose for which it was never intended.

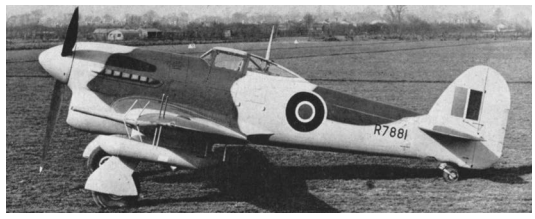
The annals of aviation have more than a fair sprinkling of aircraft that have succeeded in spite of themselves and among those must surely be counted the Hawker Typhoon, the design of which commenced at a time of radical change in fighter aircraft design, when the Royal Air Force's first generation of fast, monoplane types were only just beginning to enter service. For an air force emerging from the biplane era, the follow-on to the first monoplane types was, not surprisingly, hard to define.

Envisaged by Sydney Camm as a follow-on from the Hurricane, this new development went down two parallel avenues and each suffered severely by coupling a new, untried airframe to equally untried engines. The consequences were dire and required

The founding Typhoon-force Squadron, No.56, formed up in two vics of three, out of Duxford. Note the yellow band over the wing, a continuation of the first identification bands in black & white stripes underside. All have the three-blade propeller originally used.




US X
US H
US C
US A



Among the experimental applications tested on the Typhoon, was the radar equipment applied to this Mk.1B, together with long-range tanks. The four 20mm cannon armament would have had a devastating effect on any enemy night intruder, but this installation never progressed beyond the test stage.

protracted development phases.

On August 30th, 1938, the Hawker Aircraft Company received an order for four prototypes of an interceptor fighter submitted to fulfil Air Ministry Specification F.18/37, which was evolved around the new 2,000 h.p. Rolls-Royce Vulture and Napier Sabre aero-engines, then currently under development. Of the four machines, two were to be Vulture powered as the Type R, and two fitted with the Sabre as the Type N.

The Type R, named Tornado, first flew during the winter of 1939, but were abandoned due to difficulties with the Vulture engine that caused such grief when applied, in service, to the Avro Manchester and which in turn prompted the Avro Lancaster.

The first Type N, named Typhoon and serialled P5212, made its maiden flight on February 24th, 1940, piloted by Hawker's test pilot Philip Lucas, who shortly afterward received the George Medal for landing it from a test flight with a structural failure in the fuselage.

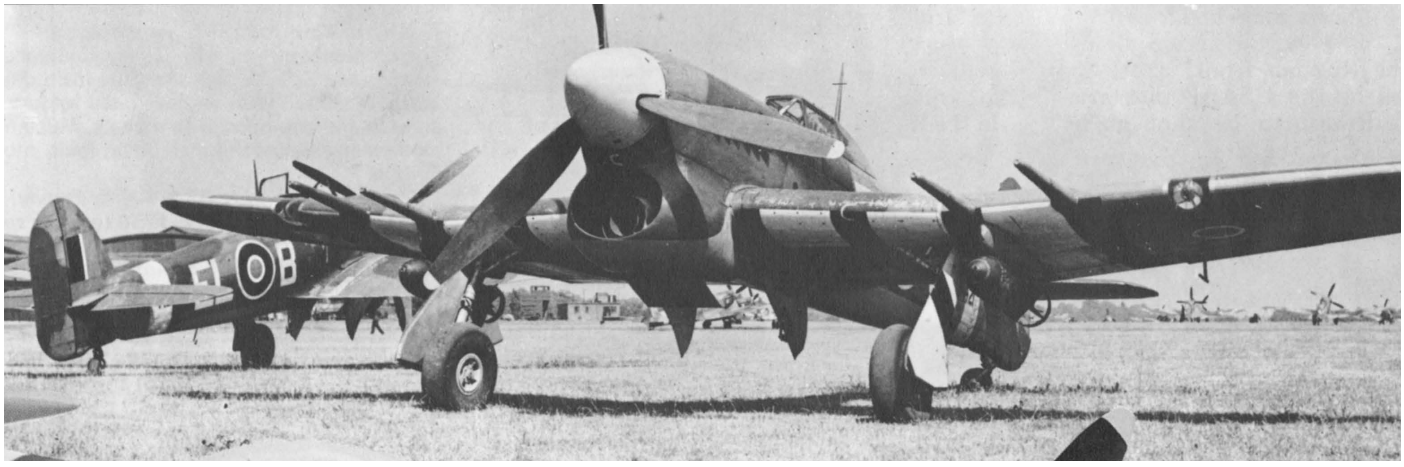
Other troubles came to light, notable among which was a tendency for the machine to catch fire on starting up. Both these faults were to persist, with serious results. P5212 was eventually armed with six .303 in. Browning machine guns in each wing, due to delay in the production of the proposed armament of four 20 mm. cannon, and a further brake on progress was applied in May, 1940, when Typhoon priority was cancelled in favour of the vital Hurricane programme. The impending air battle that became the Battle of Britain demanded concentration on the supply of fighter aircraft in immediate production.

In October 1940, priority was reinstated, and the bulk of production was placed in the hands of the Gloster Aircraft Company at Hucclecote, Glos. Although the second prototype, P5216, flew on May 3rd 1941, the main weight of tests and trials fell upon P5212, during which it attained speeds in excess of 400 m.p.h. However, Service test pilots raised grave doubts as to the Typhoon's potentialities as an interceptor fighter such as the awful lack of view from the cockpit and poor manoeuvrability at the kind of altitude above 20,000 ft, which were becoming the norm in air fighting. These doubts were heightened by snags in the Chatellerault belt feed mechanism for the 20 mm. guns now fitted to both prototypes, and by the low speed handling, which revealed a violent swing on take-off and a high stalling speed. Another dangerous feature was carbon monoxide penetrating the cockpit, requiring oxygen to be breathed at all times; contemporary handling notes stated that *". . . men cannot breathe in the slipstream..." **

Saved by the opposition!

For the moment, the Typhoon's future hung in the balance, and then the Luftwaffe introduced the Focke Wulf Fw 190, outclassing all R.A.F. fighters and damaging public morale by fast low-flying attacks on the South Coast. For such low level interception, the Typhoon was the only fighter with the performance to counter these attacks

A line-up of Typhoon 1B aircraft belonging to No.193 Squadron, possibly at RAF Manston, Kent in late 1943.



After initial lack of success as a pure fighter due to poor higher altitude performance, the Typhoon became indispensible in the ground attack role with 2nd Tactical Air Force during the drive through Europe after D-Day, regularly upping sticks to more forward bases, to follow the ground forces advance.

LAST MAN STANDING!

With the cut-back of aircraft types retained by the military at the end of WW2, many types that had provided a significant contribution to victory simply disappeared. One such was the Hawker Typhoon, quite clearly superseded by aircraft with better performance - and the Royal Air Force was busy concentrating on the dawn of the jet age, while introducing 'ultimate' piston engined fighters like the Hawker Tempest II and the De Havilland Hornet.

Of 3,300 Typhoons built, all are gone - except for one that had been shipped to USA in March 1944, for evaluation at Wright-Patterson Air Force Base, Dayton, Ohio. Here, after accumulating only nine hours of flight time, the aircraft sustained some minor damage and was placed in store.

In the late 1940s USAAF Chief of Staff, General 'Hap' Arnold collected some sixty aircraft types that were put into storage as a potential nucleus of an historic aircraft collection - among them was Typhoon Mk1b MN235. Crated, it eventually found its way to the Smithsonian Institute's reserve aircraft collection at Silverhill, Maryland.

In 1967, the sole remaining Hawker Typhoon was exchanged for a Hawker Hurricane IIc and arrived back in UK. Here, restoration work was undertaken to replace one missing 20mm cannon, most of the engine cowlings, starboard aileron, undercarriage parts, radiator/oil cooler, side panels below the cockpit and various inspection panels.

Finally, in November 1972, MN235 was installed on permanent display at the Royal Air Force Museum, Hendon, where it remains today on proud display and where one can view and marvel at this big moose of an aeroplane, any day of the week.

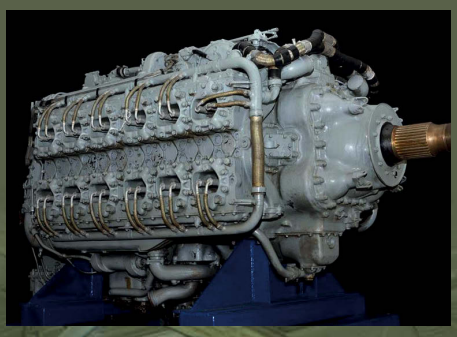
BUT MAYBE NOT FOREVER...

In October, last year, the Hawker Typhoon Preservation Group publicly launched their exciting project to restore Hawker Typhoon Mk.1b RB396. The goal is to have the aircraft to airworthy condition in time for the D-Day 80th anniversary in 2024. Project founder and trustee Dave Robinson has been working on returning a Typhoon to flight since 1999,

The Group aims to restore the Napier Sabre powered Hawker Typhoon Mk.1b aircraft to flying condition using the substantial remains of serial number RB396, and demonstrate the aircraft to the public. RB396 saw combat with No. 121 Wing of the Second Tactical Air Force's No. 83 Group, and survived a forced landing on 1 April 1945. This major restoration project, which will be carried out by professional organizations and individuals across the UK. and the project received a major boost by the donation of a Napier Sabre engine by Cranfield University

Meanwhile in Canada, there is a further restoration project where Hawker Typhoon JP843 is being rebuilt in British Columbia, also with the goal of once again returning a Hawker Typhoon to the skies. That project is being constructed using surviving parts from Typhoon recoveries, factory drawings, and highly accurate reverse engineering practices to bring the aircraft back to its former glory. The goal to see JP843 fly with the mighty Napier Sabre engine.

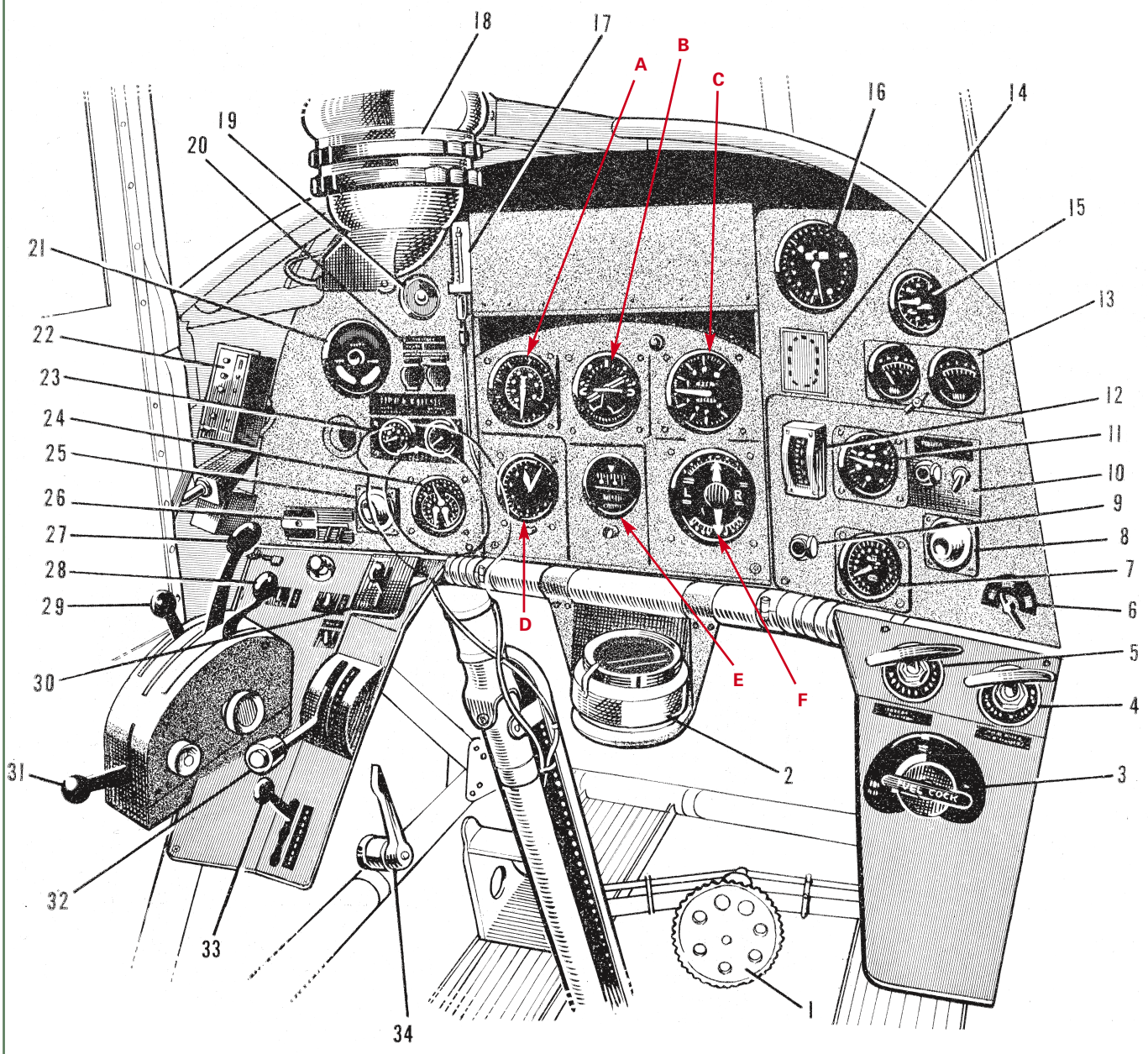
The 'Hawker Typhoon RB396 Restoration' airframe taking shape.



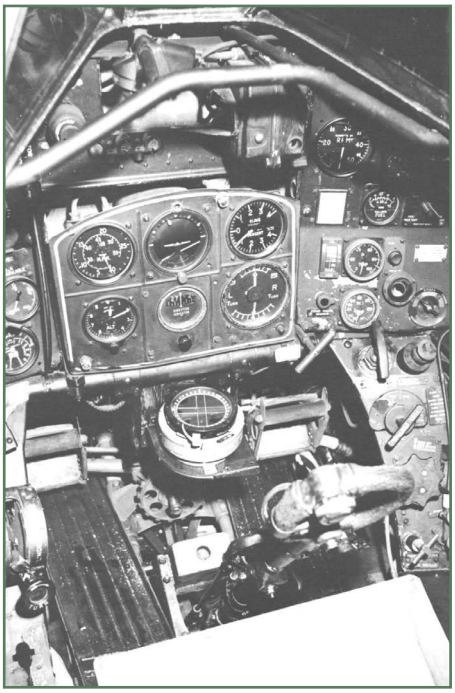
The Napier Sabre engine donated to the RB396 restoration, by Cranfield University.

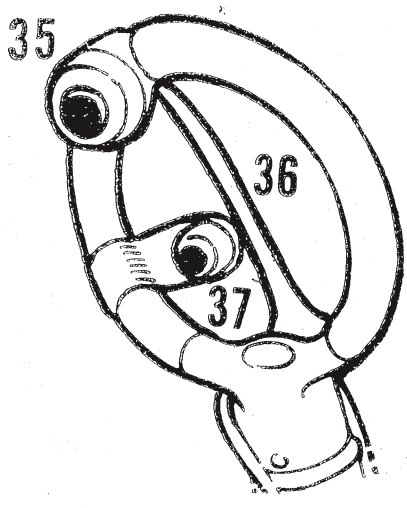
The present state of Typhoon Mk.1b JP843 with the 'Typhoon Legacy' Group, in British Columbia, Canada.

The sole remaining complete Hawker Typhoon, a Mk.1B at the RAF Museum, Hendon.



THE HAWKER TYPHOON COCKPIT





CONTROL COLUMN DETAILS

KEY:

1: RUDDER PEDAL ADJUSTER.
2: COMPASS.
3: FUEL COCK (NOSE & MAIN TANKS).
4: CARBURETTOR PRIMER.
5: CYLINDER PRIMER.
6: FUEL TANK PRESSURE COCK.
7: RADIATOR TEMP GAUGE (BLUE RIM).
8: AIR LOUVRE.
9: POWER FAILURE WARNING LAMP.
10: SUPERCHARGER PANEL.
11: OIL TEMP (YELLOW RIM).
12: OIL PRESSURE (YELLOW CASE).
13: FUEL GAUGES (NOSE & MAIN TANKS).
14: COMPASS DEVIATION CARD.
15: BOOST GAUGE (RED RIM).
16: R.P.M. GAUGE.
17: FLAP POSITION INDICATOR.
18: REFLECTOR SIGHT (WITH SORBO PAD).
19: CONTACTOR CLOCK (RADAR IDENTIFICATION).
20: ENGINE STARTER BUTTONS.
21: UNDERCARRIAGE INDICATOR.
22: V.H.F. RADIO SELECTOR.
23: OXYGEN CONTROL PANEL.
24: AIR PRESSURE GAUGE.
25: AIR LOUVRE.
26: IGNITION SWITCHES.
27: THROTTLE.
28: PITCH LEVER.
29: MIXTURE (SOME A/C ONLY).
30: ENGINE START/CUT-OUT.
31: RADIATOR SHUTTER LEVER.
32: UNDERCARRIAGE LEVER.
33: FLAP LEVER.
34: UNDERCARRIAGE EMERGENCY PEDAL (ALSO ON STARBOARD).
35: GUN FIRING BUTTON.
36: BRAKE LEVER.
37: CAMERA BUTTON (SOME A/C ONLY).

CENTRE PANEL
A: AIRSPEED.
B: ARTIFICIAL HORIZON.
C: CLIMB/DESCENT INDICATOR.
D: ALTIMETER.
E: DIRECTIONAL GYRO.
F: TURN/BANK INDICATOR.

and as a direct result, development of the Typhoon was accelerated.

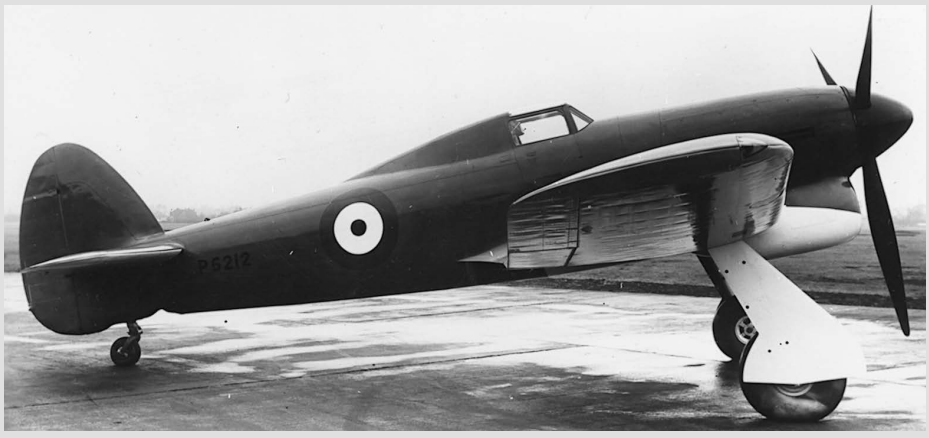
RAF Duxford, near Cambridge was selected as a base for the working up of a Typhoon Wing, the founding squadron of which was No. 56 Squadron, receiving initial deliveries of a very mixed bag of very early Typhoon Mk.IAs during the second week of September, 1941. In March 1942, No. 266 Squadron re-equipped with Mk.IA Typhoons also at Duxford, and in the same month No. 609 Squadron's Typhoons arrived.

All these machines were a motley collection of variants some with .303 in. guns and faired-in cockpit aft of the doors, others with Perspex rear fairing, and some, officially Mk.IBs, armed with 20 mm. cannon. Standardisation was achieved later, by modification, to the Perspex rear fairing and cannon armament for all machines, together with introduction of V.H.F. radio.

The newly formed Wing encountered technical trouble in abundance, with engine fires on the ground, engine failures in the air and, worst of all, structural failure of the rear fuselage just ahead of the tail assembly, which caused many accidents. Through all this, civilian and Service personnel toiled unceasingly to eliminate the faults, and among all the other work, the rear fuselages were strengthened by the simple yet effective method of riveting fishplates all round the tail joint.

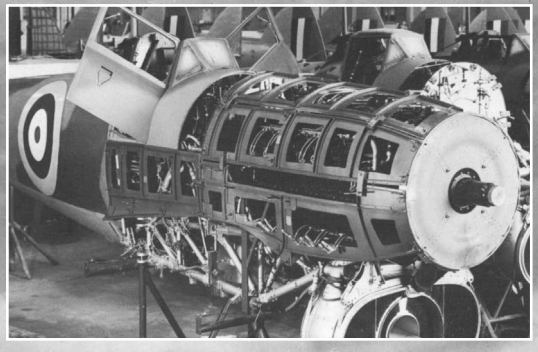
Into combat

In November, 1942, the Wing moved south to Manston and Biggin Hill, and within a week, under the leadership of



Typhoon prototype P5212, showing the small fin & rudder shape that proved quite inadequate and which was quickly changed. Equally unacceptable to anyone who had to take the type into combat was the 'solid' rear cockpit fairing that killed the rearward view from the cockpit. Whatever was the designer thinking of - did they actually talk to pilots at the sharp end of the war?

This is the third production Typhoon, fresh from the factory in June 1941. The fin and rudder are now much larger, but that rear cockpit fairing blanks off the pilot's rear view completely.

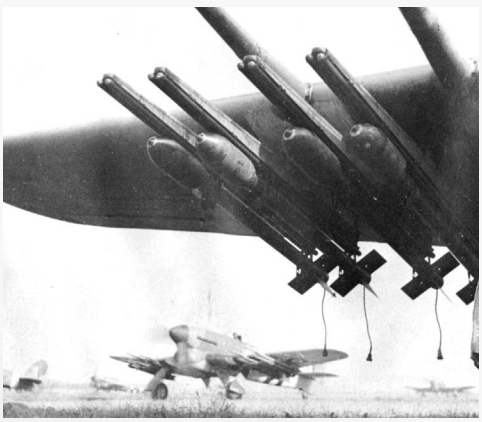


The powerful and heavy Napier Sabre engine used by the Typhoon required a suitably tough and heavy mounting. Also revealed here, is the 'car-door' cockpit access applied to the early Typhoons.

If there's one thing the Hawker Typhoon exudes, it's brute power, totally expressed in this view of a machine, bombed up and ready to go. Invasion stripes of equal widths have been applied over original identity markings, which were three white and four black.

Both Typhoon and Tornado were subject to some pretty outlandish experimental installations during development. This example is the 2nd prototype Tornado with a six-blade contra-prop installation.

The Typhoon 1A featured this 'car door' access similar to that also applied to the Bell P-39 Airacobra. In the cockpit is Wing Commander Roland Beamont, a great exponent of the Typhoon and later, a celebrated test pilot.



The knock-out punch! The Typhoon was famous for it's effective ground attack role, delivering 'quick response' attacks on enemy ground positions as Allied ground forces steam-rollered across Europe after D-Day.

Sqdn. Ldr. (later Wg. Cmdr.) R. P. Beamont, No. 609 had caught and shot down four Fw 190s. It should be mentioned at this point that similarity in outline between the Typhoon and the Fw 190 was the reason for the black and white stripes applied to the R.A.F. machines, some of which had white noses, the latter noticeable during the Dieppe operation of 19th August, 1942.

Redefining the role

The Dieppe action also brought home the fact that at altitude the Typhoon became easy prey to the German fighters, something that soon caused the R.A.F. to concentrate the Typhoon squadrons on the low level role where, of all the aircraft employed by the Allied and Axis Powers, it became supreme. More and more Squadrons were formed, attacking enemy shipping and communications, and by the middle of 1943 as many as 150 locomotives were being destroyed each month.

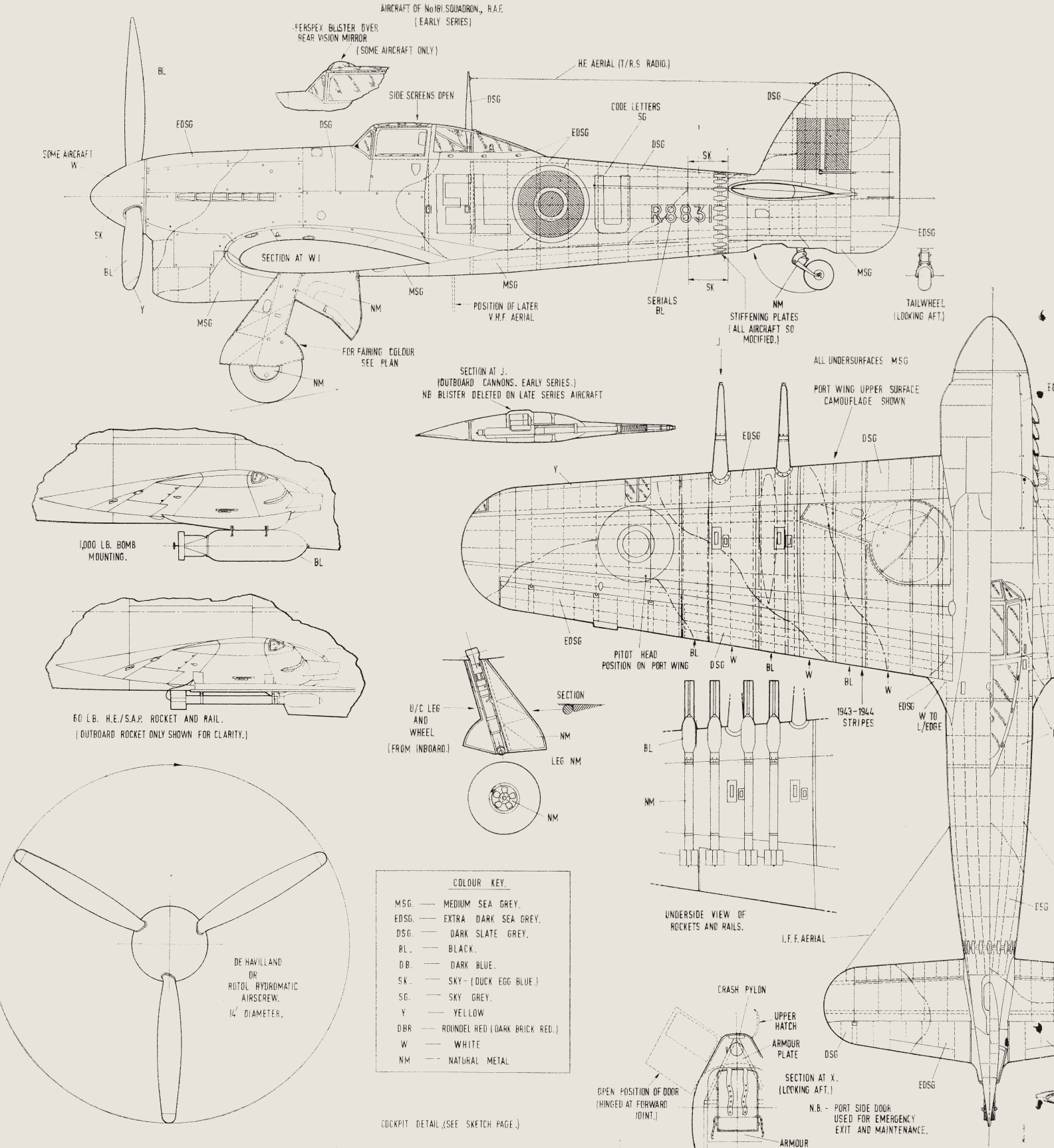
Initially pioneered by No. 609 Squadron, which had developed a private and piratical offensive against the Germans, the Typhoons began to carry bombs (the first two were plastered with 'Wings for Victory' stamps) which progressed through 250-pounders and 500 pounders to the eventual load of two 1,000-pound bombs, but the most important addition to the machine's armament came in 1943, when the Squadrons were withdrawn in rotation to be fitted with underwing rails for eight 3 in. rockets, carried as an alternative to the bombs. Using these weapons, tremendous havoc was wrought on both land and sea targets, for a salvo of rockets was similar in effect to the main armament of a naval cruiser.

By 1944 the Typhoon's faults had been mastered and, with the Hawker Tempest coming into service, twenty-two Typhoon Squadrons were formed into the Second Tactical Air Force, the aircraft receiving a final major modification consisting of a clear-vision bubble canopy. From just prior to D-Day (June 6th), when Typhoons destroyed the vital German radar installations, until the end of the war, this deadly support fighter roamed the European battlefield, and in one day alone they destroyed 135 enemy tanks. In July 1944, Field Marshall Rommel himself was wounded by 193 Squadron, and in October five Squadrons shattered the H.Q. of the German Fifteenth Army, the H.Q. of the 88th Corps suffering the same fate in February 1945.

At the war's end, the Typhoon was speedily replaced by the Tempest, and nearly all machines were immediately scrapped. In all, a total of 3,330 were built, 254 of them being Mk.IA, the majority of the latter being converted to Mk.IB standard. A small number of experimental variants were developed, including a radar-equipped night fighter, a tropical version, which underwent tropical clearance trials at Khartoum, and one machine with an annular radiator. A few Typhoons were fitted with three F.24 cameras in the port wing, being designated F.R.IB.

• *This note referred to the refusal to allow ground crew to ballast the tail during an engine run by the usual system of four bodies lying over the tailplane. It was necessary instead to shackle the Taffies by special harness to a link in the blast-bay floor!* ■

Factory test flight, running up on chocks with restricted power to prevent tail lifting and risking prop damage due to low ground clearance. Engineers cling to wheel fairing, not normal practice! Tiffie slipstream was vicious - full power runs required strapping over rear fuselage to ground shackles.



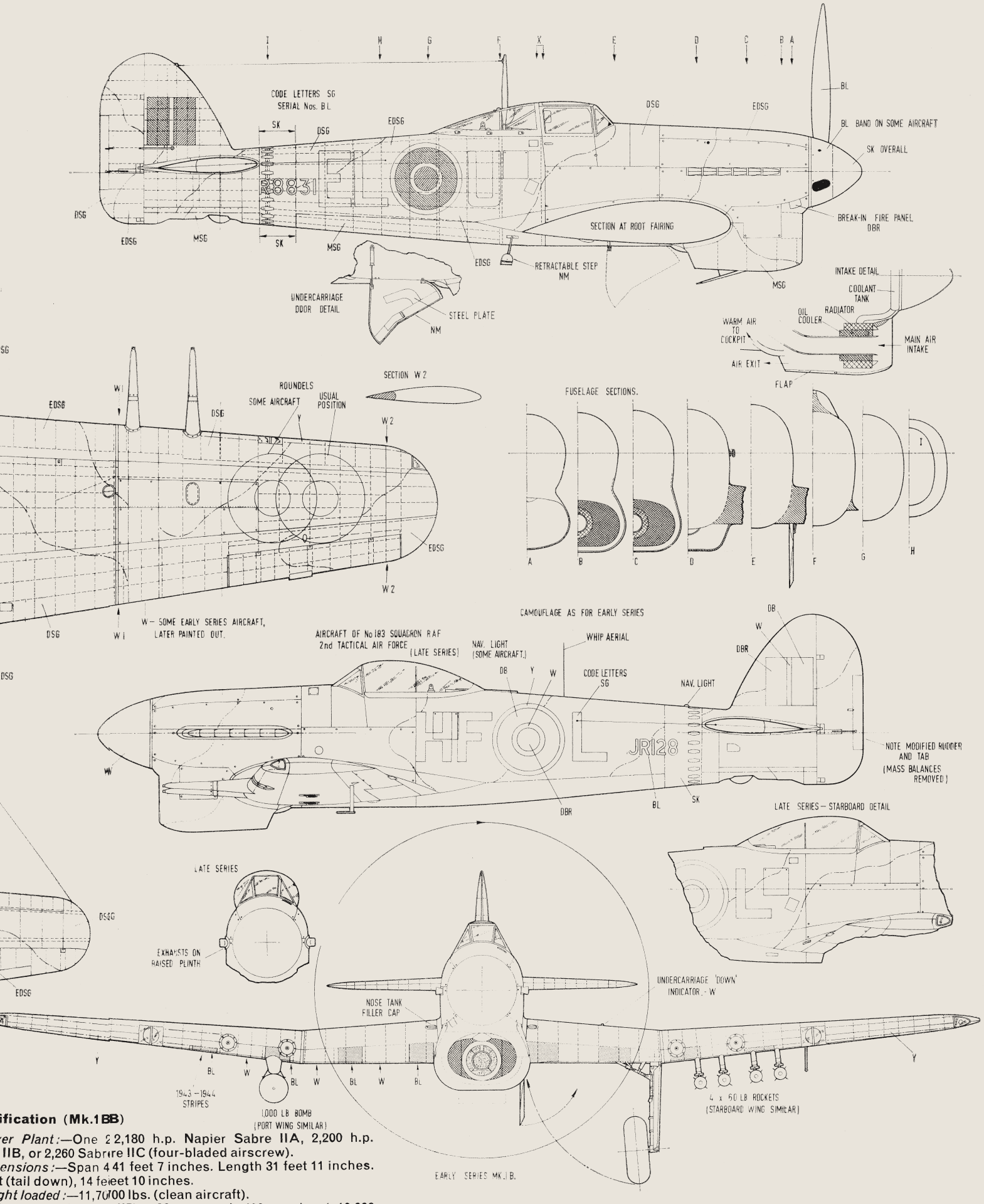
COLOUR KEY.

MSG.	—	MEDIUM SEA GREY.
EDSG.	—	EXTRA DARK SEA GREY.
DSG.	—	DARK SLATE GREY.
BL.	—	BLACK.
DB.	—	DARK BLUE.
SK.	—	SKY - (DUCK EGG BLUE.)
SG.	—	SKY GREY.
Y	—	YELLOW
DBR	—	ROUNDEL RED (DARK BRICK RED.)
W	—	WHITE
NM	—	NATURAL METAL

HAWKER TYPHOON MK.1A & MK.1B

Spec

Pow
Sabre
Dim
Heigh
Wei
Perf
feet. R
Arm
solid f



ification (Mk.1BB)

er Plant:—One 2,180 h.p. Napier Sabre IIA, 2,200 h.p. IIB, or 2,260 Sabre IIC (four-bladed airscrew).
ensions:—Span 41 feet 7 inches. Length 31 feet 11 inches. t (tail down), 14 feet 10 inches.
ght loaded:—11,700 lbs. (clean aircraft).
ormance (*Sabre I IIB*):—Max. speed, 409 m.p.h. at 10,000 ange (internal fuel), 380 miles.
ament:—Four 20 mm. Hispano Mk.I cannon, eight 3in. uel rockets or two 250, 500, or 1,000-lb bombs.

SCALE 1:60

WESTLAND WIDG

The Widgeon has been a firm favourite with free flighters from way back. Here Phillip Kent offers a 58" wingspan, 1: 7.5 scale four function R/C model for electric power

Phil Kent's prototype climbs away on a test flight, resplendent in all-red colour scheme.

GEON Mk.III

The original Westland Widgeon was the first high-wing monoplane to be built by Westland, and was the first in a series of these aircraft that led, eventually, to the famous Lysander of the Second World War. The Mk.I version of the Widgeon was designed for the Air Ministry's *Light Aeroplane Competition* that was to take place at Lympne in the autumn of 1924. The 30 foot span Widgeon was originally intended to be powered by a twin-cylinder Bristol Cherub engine,but was eventually flight-tested with a three cylinder Blackburne Thrush engine.

The aircraft was unfortunately wrecked by a strong down-current on its first circuit of the course in very gusty conditions during the competition. The aircraft was attempting to tum close to the ground to avoid the strong wind but it was blown sideways and caught a wing tip on the grass. It caused the aircraft to cartwheel and collapse around its pilo,t Capt Winstanley, who was uninjured apart from some bruising.

Although its flight time had been brief, the Air Ministry report had praised the design and engineering features even though the performance and handling characteristics had been largely unexplored. This led to the aircraft being rebuilt with some modifications and using an Armstrong Siddeley Genet I five-cylinder radial engine that was much more powerful.

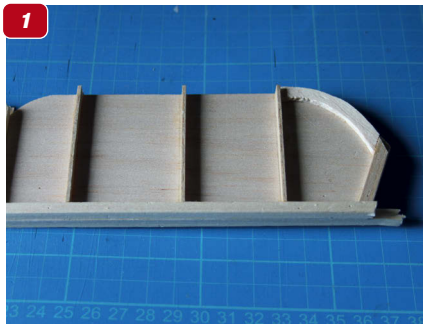
During the autumn of 1926, Westland decided to enter the commercial private owner market with a development of the Widgeon. For this, the Mk III, it was decided to abandon the complex Widgeon Mk.I lozenge shaped wing by substituting a constant chord design which would be easier and cheaper to produce. The fuselage, tail unit and undercarriage were also redesigned giving the new machine a completely different look. Revised centre sections for the wing were also provided so that the wing sweepback could be varied to suit the different engines used in the type.

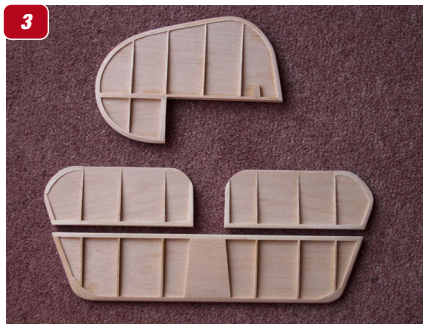
The first public mention of the Widgeon III was in an advertisement placed in *The Aeroplane* Apri113th, 1927 issue. It was claimed to be the fastest two seat light aircraft in the world and was able to fly for 20 miles on a gallon of fuel. A total of 26 Widgeons were produced by Westland between 1926 and 1930 when production ceased due to military commitments.

The Model

Models of the Widgeon have been built for many years. The first design that I saw was one by the great Eddie Riding in the April 1943 *Aeromodeller* magazine. This small rubber powered model did however have the tailplane area and fin area increased to improve the flying performance. My next brush with the

CONSTRUCTION - TAIL UNIT





1: The elevator construction begins over a sheet balsa core. 2: Tailplane and elevator structure now formed with leading edge, hinge spar line and tips all added. 3: Rudder, elevator and tailplane sanded to shape.

Widgeon was when I obtained the Dennis Bryant drawings, one his range of several radio controlled scale models in his *Elite* series. In the end, I chose to build the Comper Swift from this selection of designs, but the Widgeon always interested me and with the advent of more practical electric power units, this is the direction that I took for the model presented here. This 58" span replica uses an inexpensive motor, speed controller and battery pack. It will also fit easily into a modern hatch back car without having to take it to pieces.

My usual approach to any new model I build is to get all the components cut out before starting on the construction. The wing of the Wideon has a parallel cord so only one plywood template is needed. Ribs 1, 2 and 3 can be made by cutting down full length ribs. The Widgeon has full span ailerons and these are built separately. The fuselage is a straight forward box with a rounded top decking. The tail unit uses balsa cores with ribs and spars each side.

CONSTRUCTION

Tail unit

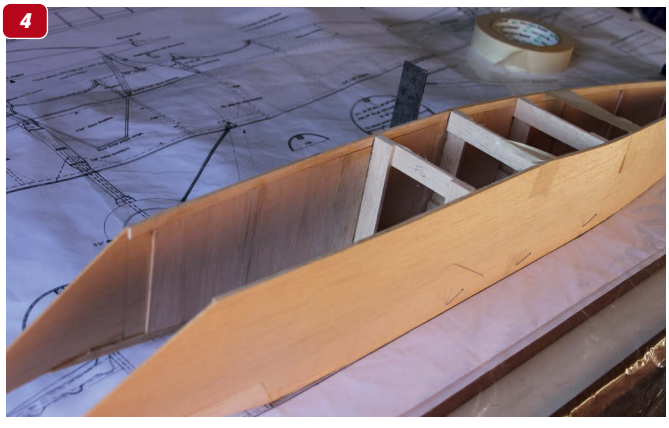
I like to see something for my early work and like to build the tail unit first. Select some stiff, light 1/16" sheet balsa for the cores. Cut the items to shape remembering that the rudder has a laminated outline and will be smaller than the outside shape. Mark the positions of the ribs and spars on the cores in pencil and then glue the pieces in place on the first side. When dry, turn over and repeat on the second side. Laminate the outline on the rudder before trimming the ribs and spars to size. Use soft 1/16" sheet balsa for the laminations and cyano for the adhesive. The units should then be shaped and sanded to the correct section as shown on the drawing. The fin is a simple unit from soft 3/8" sheet balsa.

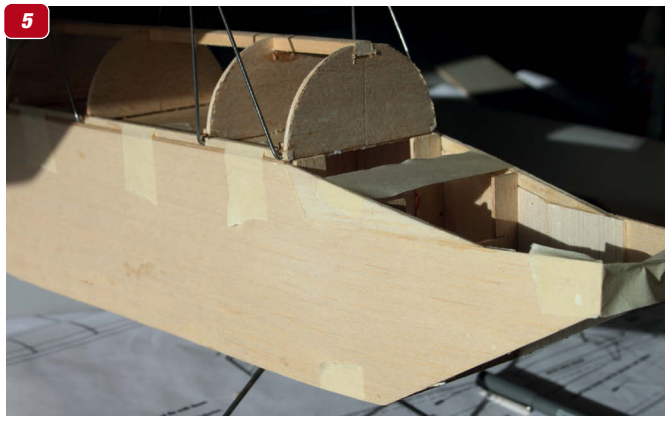
Fuselage

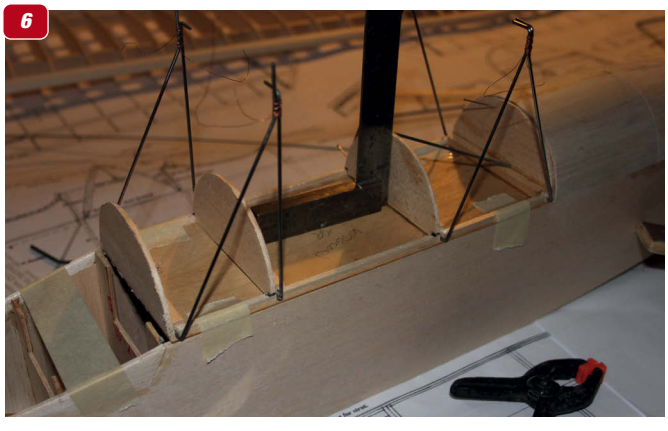
The fuselage uses a pair of 1/16" sheet balsa sides to which longerons and uprights are applied as in the sketch on the drawing. When these have been fitted, join the sides to make the basic box. The box should be built inverted on the plan view using formers F3B to F6B. Pull in at the stempost to the filler piece and then add the 3/16" square cross pieces. Do not cover the underside of the fuselage yet.

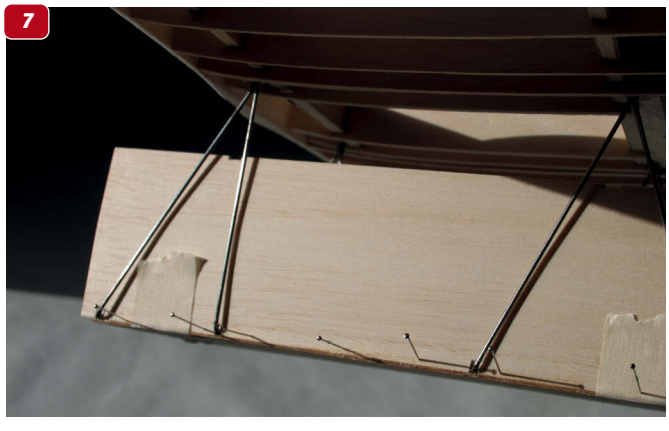
Remove from the board and add the rear decking formers and the balsa tailplane mount. Fit the hardwood blocks

CONSTRUCTION - FUSELAGE









4: The basic balsa box fuselage, built inverted over the plan. 5: Front end of the basic fuselage. 6: Wire entre section wing struts, prior to addition of streamline wood fairings. 7: Sheet balsa ready to roll over the fuselage decking (see also Picture 8).

and the ply fittings for the undercarriage with epoxy. The nose of the fuselage is constructed of sheet balsa with a block balsa nose. Note that the former for mounting the motor will vary in size and position depending on the motor used. Bend the wires for the wing cabane struts before starting the make the removable decking that includes the front cockpit. Cut the 1/32" plywood bottom and fit the formers F4 to F5R. Now add the bass wood pieces that carry the brass brackets for the 20swg wires. Fit the brackets and the cabane wires and spot-glue with epoxy, then jig the rear struts to the correct angle, also adding the 20swg wires and then bind with copper wire.

Repeat for the front cabanes and then soft-solder the items together where shown on the drawing. Enclose the wires that are fitted to the plywood bottom with l/4" square spruce, with a corner removed for the wire.

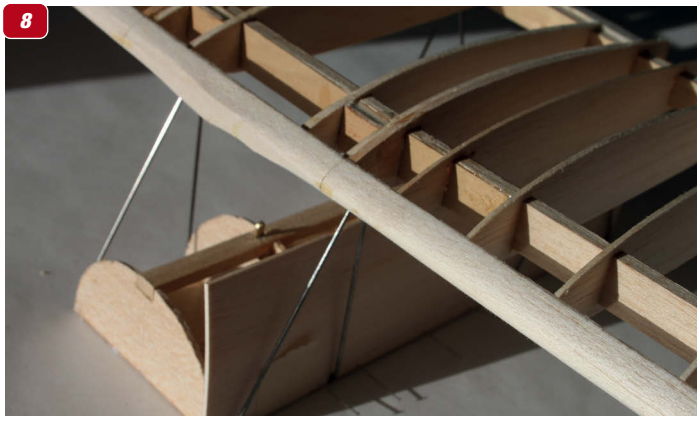
At this stage, make provision for fastening the wing and fuselage section to the fuselage. I used a dowel at the rear and two nylon bolts at the front. The 1/16" rolled covering can be fitted after the dowel peg and front ply mounting plates have been fitted. Put the fuselage on one side now until the wings are built.

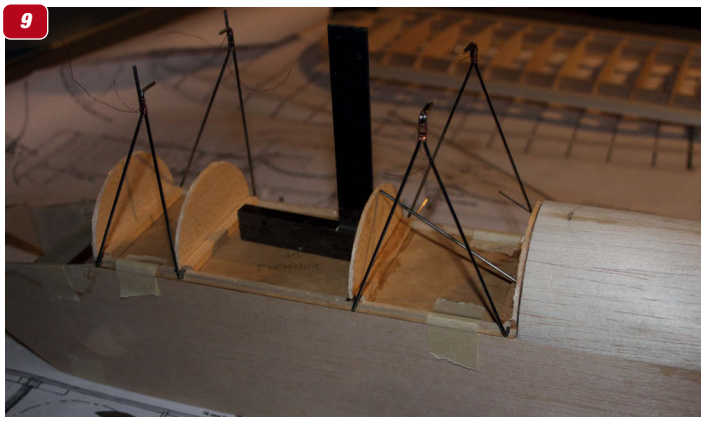
Wings

The wings are unusual for a scale model as they have full span ailerons. Slide the spars through the ribs and then position the structure directly over the plan, noting the shape of the spars at the wing tip. Pin the rear spar in place and pack up the ribs with 1/4" square balsa strip. Using cyano, Zap the spars and trailing edge in place. Pin the aileron spar in place over the plan using 1/32" scrap balsa sheet as spacers between the spar and the aileron leading edge. Pin down the hard balsa trailing edge and then fit the aileron ribs. Fit the 3/8"x 5/8" balsa leading edge and the sheet balsa tip pieces.

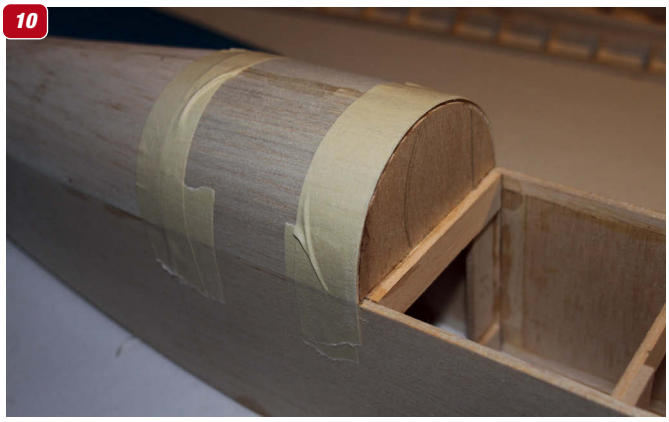
When this assembly is dry, remove the wing and aileron from the board and shape the tip to take the strip laminations. Thereafter, pin back down on the building board and wrap the strip laminations round the tip shape. Use cyano adhesive for this operation. Build up the tip using three laminations. You will need to cut the strips in triangular pieces and attach the widest part at the leading edge. Shape the leading edge and the tip using a razor plane and garnet paper.

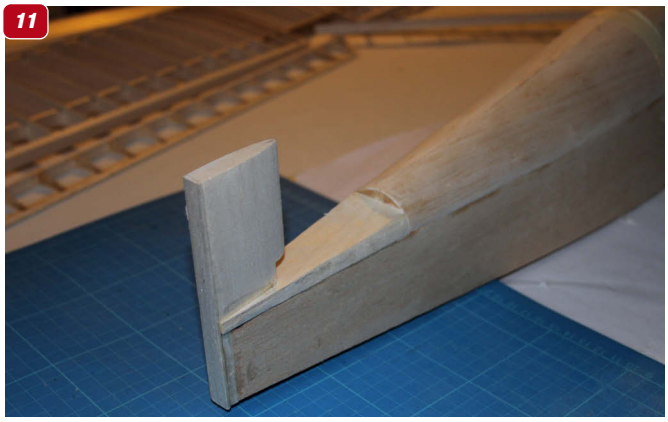
At this stage, the ailerons can be cut away and the slots for the plywood dihedral braces can now be cut into both wings. Build the centre section on the board on 1/16" packing pieces and then slide





8: The sheet balsa covering in place, ready to roll over the fuselage upper structure. 9: Another view of the basic wire wing support struts, prior to adding the balsa fairings, that go on later.





10: The sheet balsa rear top decking, in place, rolled over the upper fuselage formers and held in place with masking tape. 11: The fin and tailplane mount.

the outer panels into place. Also use packing pieces to set the wings at the correct dihedral. Remove the outer panels, glue and fit back in place, making sure that the wings line up accurately before pinning everything together again on the packing pieces.

The ailerons are each driven by individual servos installed in each wing. These are fitted in place on my model permanently without access holes. I tend to use a small metal geared servo like the Hitec HS 82 MG for models of this size. Fit the strut carrying plywood inserts on the lower surface of each wing and the aileron push rod outlets on the upper surface. The pushrods should be fitted before this is done.

The bottom surface of the centre section can be covered with 1/16" but do not cover ahead of the front spar or behind the rear spar until the wing has been mounted on the fuselage cabane structure.

Make up a jig from scrap wood to hold the wing in the correct position for fitting to the cabane structure. The shape can be obtained from the fuselage side elevation on the drawing. Epoxy the cabane wires in place holding them with small plastic spring cramps. When dry, fill in the front of the wire with 1/16" plywood plates and packing pieces. Run the servo wires down the rear of the back cabane struts, extending the wires if necessary. Add balsa fairings to these struts.

Complete the centre section sheeting and then build up the fuel tank on top of the centre section. Note the angle of the tank sides, covering the

WESTLAND WIDGEON Mk.III

(PLAN FSM/532)

Full size copies of this one sheet plan are available from
Flying Scale Models
Plans Service, Doolittle Media, Doolittle Mill,
Doolittle Lane, Totternhoe,
Bedfordshire, LU6 1QX.
Tel 01525 222573
enquiries@doolittlemedia.com
Price £12.50 plus p&p (U.K £2.50;
Europe £4.00;
Rest or World £6.00.

tank with O.4mm ply. The straps and filler cap are added after the model is painted.

Fuselage: stage 2

The wing and cabane unit fixings can now be completed and bolted in place. The front battery hatch is constructed next. There are several variations of engines and cowls that were applied to the full size Widgeon from which the builder of this model can choose. The one shown on the drawing is easiest to make and is the one that I would recommend. My own model was based on the full size aircraft G-AAFD that was fitted with an exhaust that exited on the port side according to my photograph.

Mount the motor on a birch plywood plate of at least 1/8" thickness and fit a battery box in the hatch opening. The undercarriage uses a torsion bar system with two main legs from 12swg piano wire, while the oleo legs that attach to the upper fuselage sides are simple 16swg wire floating in brass tube. The rear legs are fitted into a grooved hardwood cross member in the fuselage and are soft soldered to the main legs. A brass attachment bracket is fitted to the hardwood cross member to carry the bottom of the 'V'-strut.

Complete the installation of the servos and push rods before going on to complete the bottom fuselage balsa sheeting. Carve the nose from block balsa and sand to shape, before finally finishing the airframe by completing the struts. These are from 16swg wire faired with balsa. To obtain the correct size, use adjustable brass tubes soldered in place with the model inverted. Cover with balsa and carve to the section shown on the drawing. The struts are bolted in place at the fuselage and fastened to the wings with small self tapping screws.

Dash boards can be fitted in the cockpits and a pilot in either will improve the model. The opening surrounds were from split cable and the wind screens from clear plastic sheet. A dummy exhaust system again gives the model a more realistic appearance. Carved soft balsa was used for this item on my own model.

Finishing

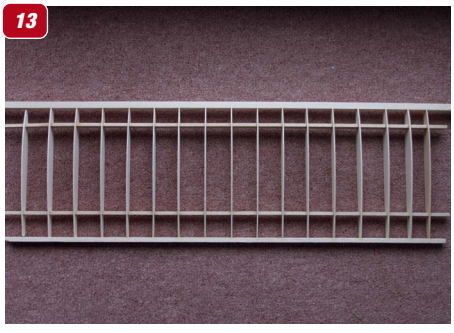
I like to make my own horns for the controls using brass and glass fibre board which I epoxy into place. On a model like the Widgeon, they do add character and look much, much more realistic than those commercial plastic ones. Give the model a good sanding. Pay particular attention to the trailing edges, keep them sharp. The fuselage is an all sheet structure and I covered it in tissue. Fill the grain with sanding sealer first, rub down and then dope on damp tissue. When dry, re-coat with sanding sealer and rub down again.

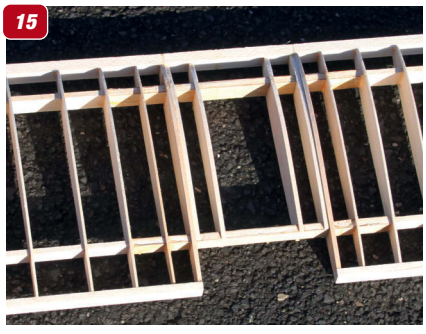
The wings and tail unit were covered in *Solartex*. I like to use the more lightweight unpainted variety, but it's up to the builder. After heat-shrinking, I give the covering a coat of thinned clear shrinking dope which I find helpful in avoiding sagging of the covering in hot weather. Torn *Solartex* rib tapes do add to the look of the model and these should be applied, if required, before doping. My model was spray painted using cellulose. Percy Powel who built the silver and red machine used *Solarfilm* for covering his model, again the choice is yours.

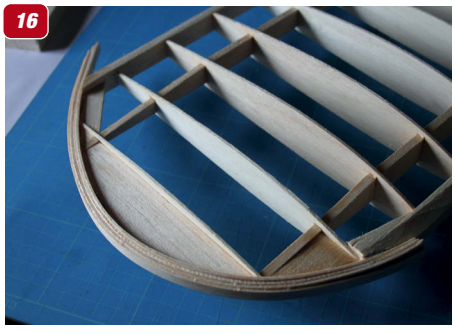
Flying

I used a motor from a foam Wot 4 originally and this proved to have more than enough power for the Widgeon. There was a problem though. This was the way that the motor had to be mounted. On the Wot 4, the motor was front-mounted on a metal mount. This way of mounting was impossible to achieve on the Widgeon and the motor was mounted on a 118" ply

CONSTRUCTION - WINGS

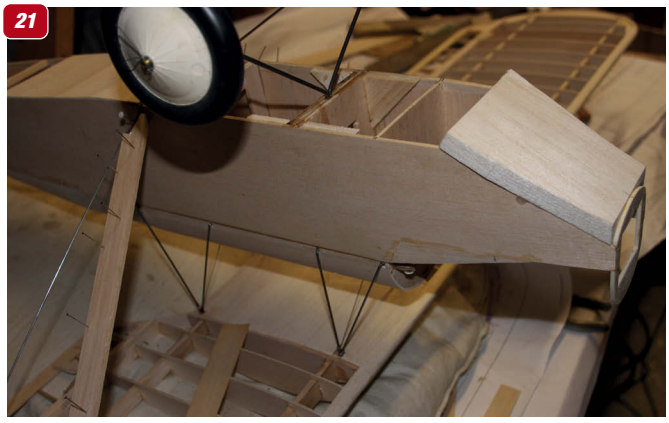


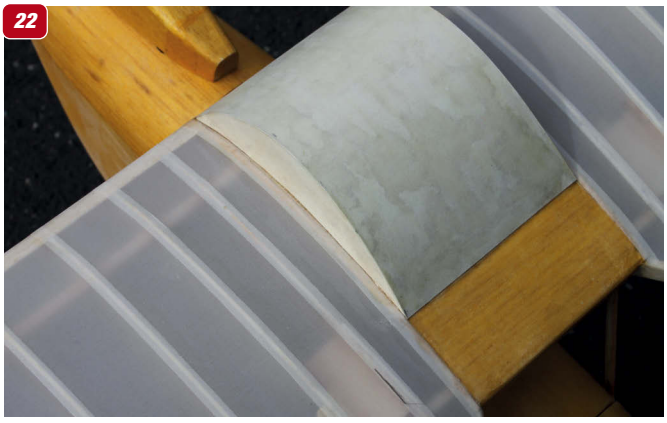




12: Wing ribs being slipped onto spars. 13: The basic wing structure of ribs, spars, leading and trailing edges. 14: Wing tip added. 15: Wing centre section with centre ribs spaced for the dummy fuel tank. 16: Wing tip, laminated from balsa strip. 17: The finished wing tip with leading edge sanded to shape, viewed from the underside. 18: Laminated tip of aileron. 19: Aileon tip after final shaping. 20: One of the wing support struts, now with laminated balsa fairing over the basic wire.

CONSTRUCTION - WINGS



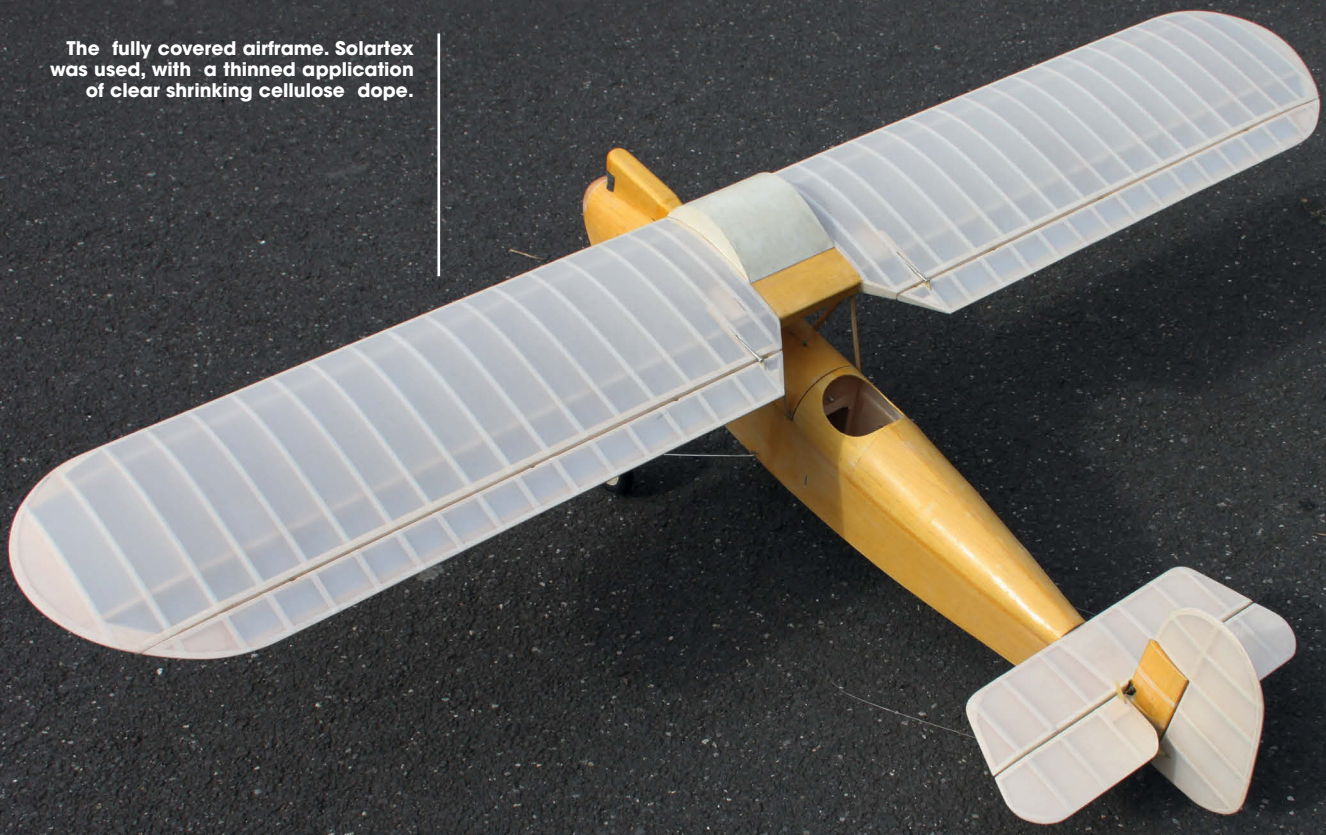


21: Front of fuselage showing basic wire undercarriage members and bottom balsa block. Wing strut has wood fairing in place.
22: Wing centre section showing the dummy fuel tank.

CONSTRUCTION - MAIN UNDERCARRAIGE

23: The anchor point for the wire main undercarriage, secured between laminations of the fuselage former.
24: Fuselage underside view, with further view of the wire main undercarriage anchor point.

The fully covered airframe. Solartex was used, with a thinned application of clear shrinking cellulose dope.



A further prototype model of Phil Kent's Westland Widgeon was built by Percy Powell, which he finished in this attractive red and siver colour scheme.

plate just behind the nose block. One of the problems was getting cooling air into the motor but the mount was not substantial enough and soon broke. I have since replaced the Wot 4 motor with a rear mounted *Typhoon Xtreme* brushless motor and this seems to have solved the problem.

Percy Powell, the builder of the red and silver model, used four cells in his model. I have managed with a three cell pack but have made the battery box big enough for a four cell battery. I have used a 40 amp speed controller, perhaps over the top but have had no problems with.

One supposed problem with the Widgeon is the lack of tailplane area The tailplane is small compared to many aircraft from that era but I have not noticed any problems when flying the model. Small tailplanes caused problems for free flight scale models and the area was often increased to aid stability. Radio controlled models do not seem to suffer in this respect but I do remember seeing that the tailplane area of the *TopFlite* Stinson Reliant had been increased to aid stability. I have flown both the prototype models and they seem to be vice free. I have not indulged in any aerobatic manoeuvres apart from stall tums and spins. The model is at its best cruising around on a warm summer day performing course manoeuvres.

Have fun with the Widgeon, it is a nice model to build and fly. ■

25

Battery, held in place with Velcro. Note also the faired main uundercarriage strut

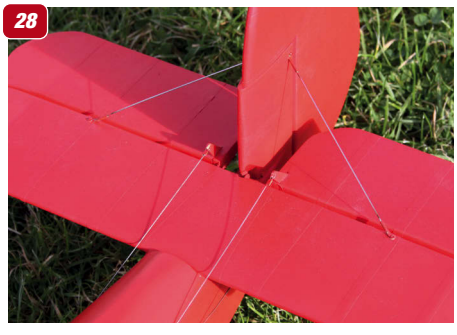
26

Nose section, showing dummy scale exhaust and main undercarriage.

27

Wing centre section showing dummy fuel tank. Note filler cap.

28



Tail section, showing rigging and close-loop elevator control wires.

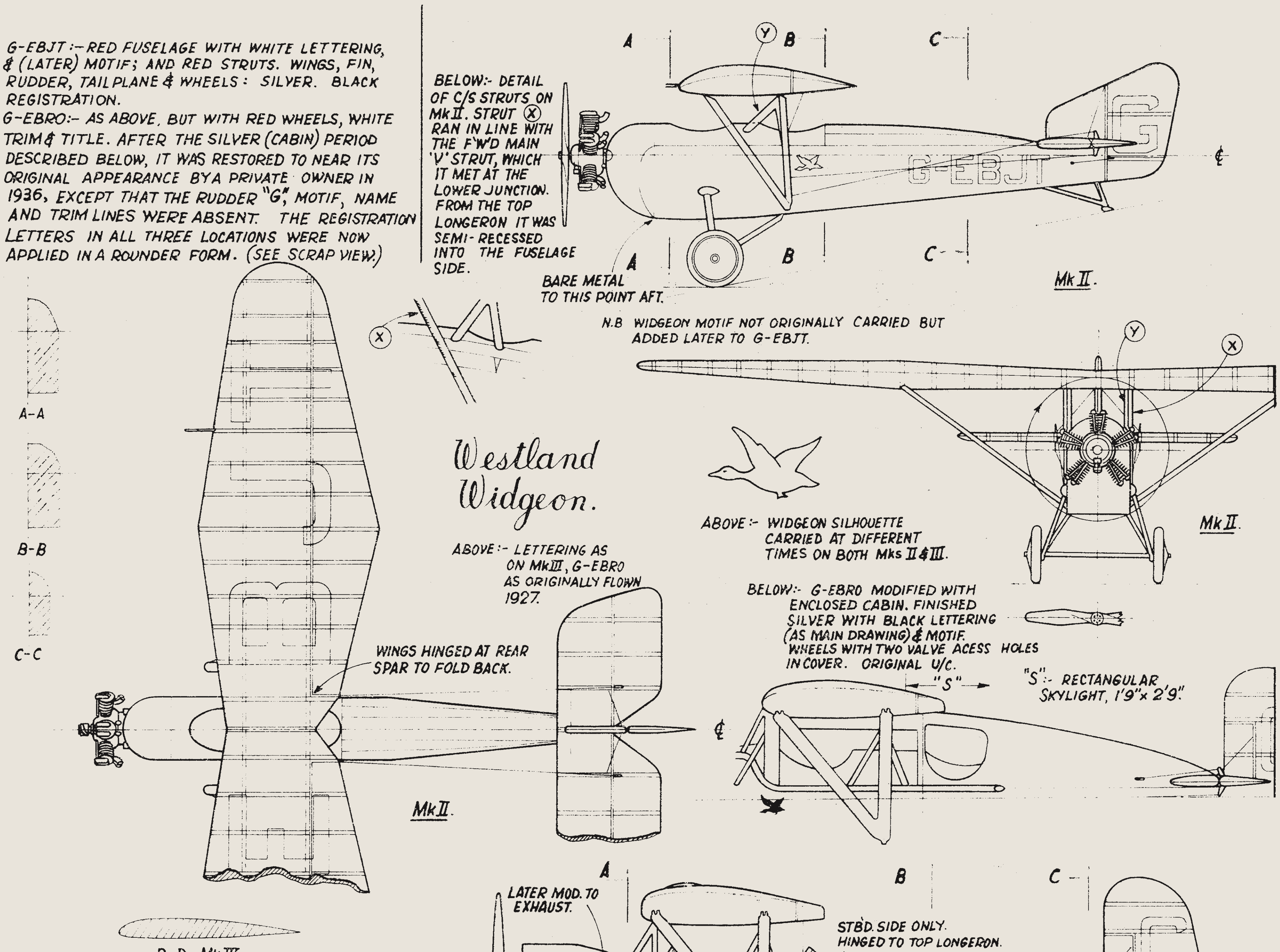
29

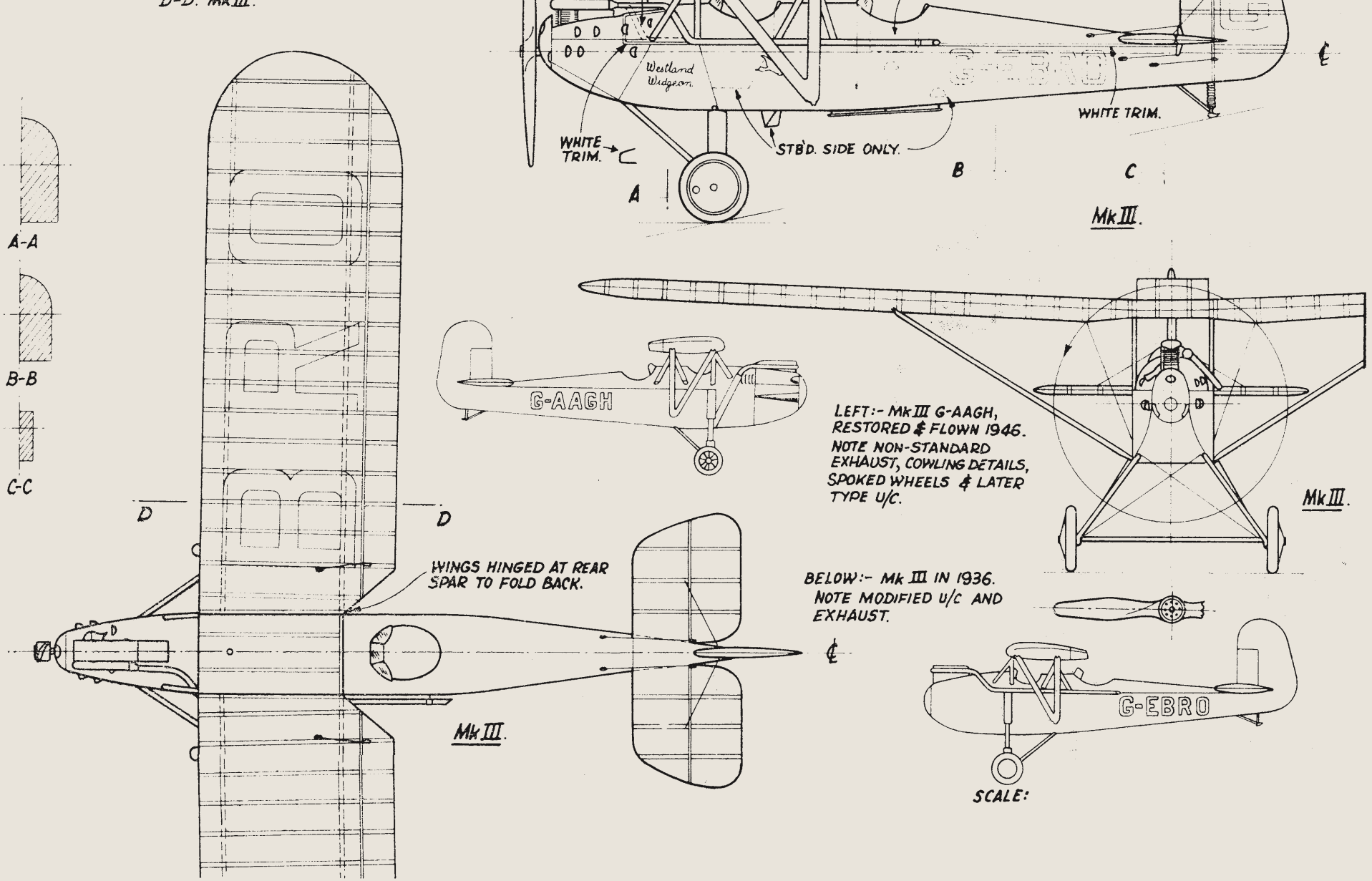
Detail of aileron push-rod and cockpit coaming.

30

Further view of the main undercarriage and dummy engine.

SCALE 1:50


G-EBJT :- RED FUSELAGE WITH WHITE LETTERING, & (LATER) MOTIF; AND RED STRUTS. WINGS, FIN, RUDDER, TAILPLANE & WHEELS : SILVER. BLACK REGISTRATION.
G-EBRO:- AS ABOVE, BUT WITH RED WHEELS, WHITE TRIM & TITLE. AFTER THE SILVER (CABIN) PERIOD DESCRIBED BELOW, IT WAS RESTORED TO NEAR ITS ORIGINAL APPEARANCE BY A PRIVATE OWNER IN 1936, EXCEPT THAT THE RUDDER "G", MOTIF, NAME AND TRIM LINES WERE ABSENT. THE REGISTRATION LETTERS IN ALL THREE LOCATIONS WERE NOW APPLIED IN A ROUNDER FORM. (SEE SCRAP VIEW.)
BELOW:- DETAIL OF C/S STRUTS ON MkII. STRUT (X) RAN IN LINE WITH THE F'WD MAIN 'V' STRUT, WHICH IT MET AT THE LOWER JUNCTION. FROM THE TOP LONGERON IT WAS SEMI-RECESSED INTO THE FUSELAGE SIDE.
BARE METAL TO THIS POINT AFT.
G-EBJT
MkII.
N.B WIDGEON MOTIF NOT ORIGINALLY CARRIED BUT ADDED LATER TO G-EBJT.
A-A
B-B
C-C
Westland Widgeon.
ABOVE:- LETTERING AS ON MkIII, G-EBRO AS ORIGINALLY FLOWN 1927.
ABOVE:- WIDGEON SILHOUETTE CARRIED AT DIFFERENT TIMES ON BOTH Mks II & III.
MkII.
BELOW:- G-EBRO MODIFIED WITH ENCLOSED CABIN. FINISHED SILVER WITH BLACK LETTERING (AS MAIN DRAWING) & MOTIF. WHEELS WITH TWO VALVE ACESS HOLES IN COVER. ORIGINAL U/C.
WINGS HINGED AT REAR SPAR TO FOLD BACK.
"S":- RECTANGULAR SKYLIGHT, 1'9" x 2'9".
MkII.
LATER MOD. TO EXHAUST.
STB'D. SIDE ONLY. HINGED TO TOP LONGERON.



Westland Widgeon Mks II & III

A WIDGEON REBORN

Back toward the end of 2011, the editor took a trip to a back-of-beyond destination (that does not register on SatNav!) at Durley Airstrip near Southampton, where the *AeroAntiques Group* led, then, by the late Ron Souch and his son Mike , together with Phil Kimber, Bill Probert and Phil Harris, were all involved in the restoration of a Westland Widgeon IIIA, that had been brought back from Australia two years previously.

Widgeon VH-UKS was originally exported, new, from Westland Aircraft's Yeovil factory in 1928 and registered to the Aeroclub of New South Wales in July 1929.

This example of the Widgeon IIIA last flew in 1946/7, but remained in Australia until AeroAntiques acquired it from Nick Challenor of Brisbane.

When it arrived at AeroAntiques, the disassembled airframe proved to be absolutely complete, including the ADC Cirrus engine. Nothing was missing and the airframe was re-registered for the UK as G-EUKS, thus preserving the three last letters of the original Australian registration.

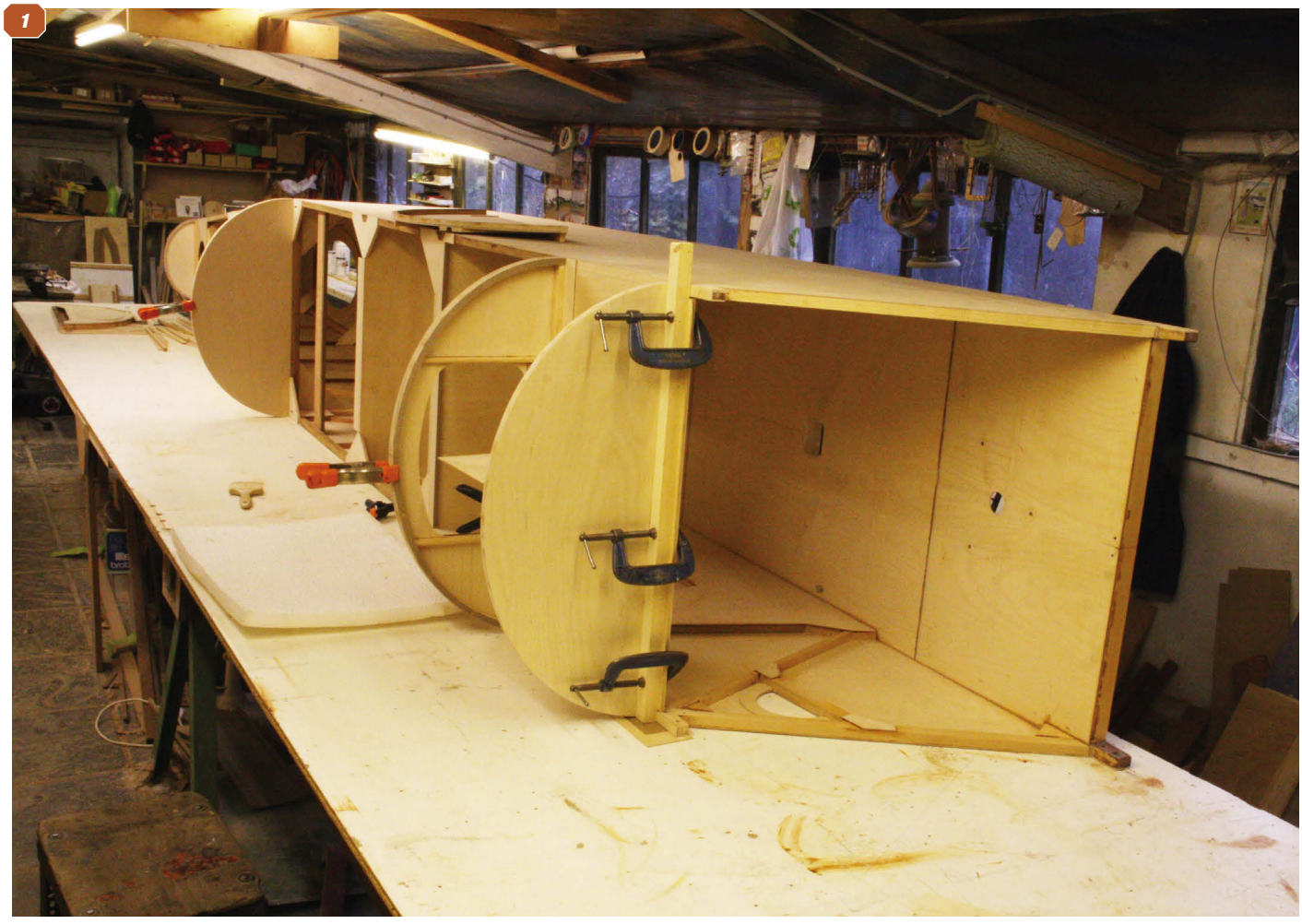
At that stage, the airframe is very much a collection of sub-assemblies some of which were tucked into various crannies of the busy AerAntiques workshops among several other current restoration projects. At the time of FSM's visit in 2011 the restoration effort was at that stage concentrated on the fuselage, for which Phil Kimber was responsible. The whole structure wheh we then saw it was one very much that of an outsize model aircraft.

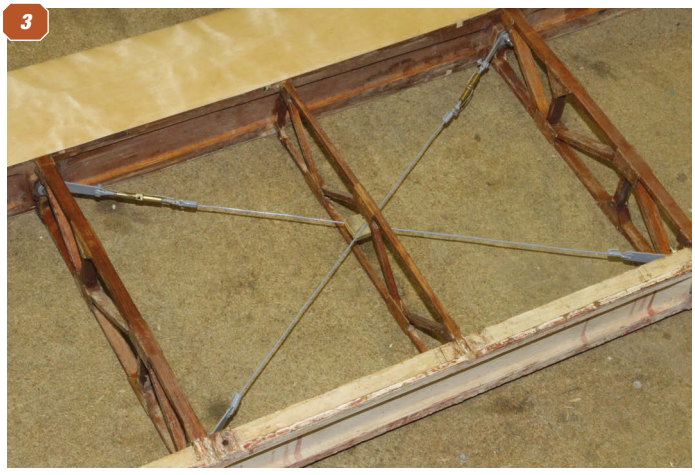
G-EUKS is one of only three Widgeons known to survive and the restoration is now complete and flyable, although presently held by AeroAntiques in disassembled state and thus not avaialbe for the *'In Detail'* photo study we would like to present in FSM.

However, if all goes as we hope, it may be possible to do just that in next month's issue. Fingers crossed.

Great stuff! ■

Phil Kimber at work on the fuselage, much of which is 'new-build', based around the original cockpit area floor.





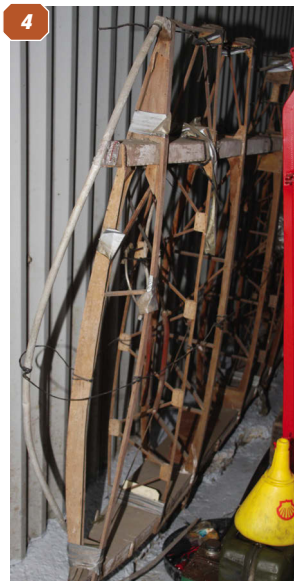
1: Another view of the fuselage, laid on its side, viewed from the front.

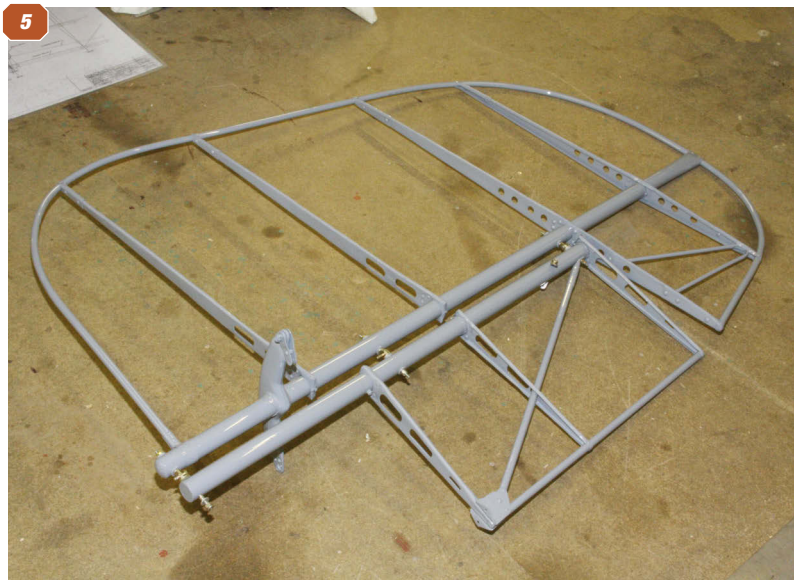
2: The original cockpit instrument panel, sans instruments, together with replacement panel.

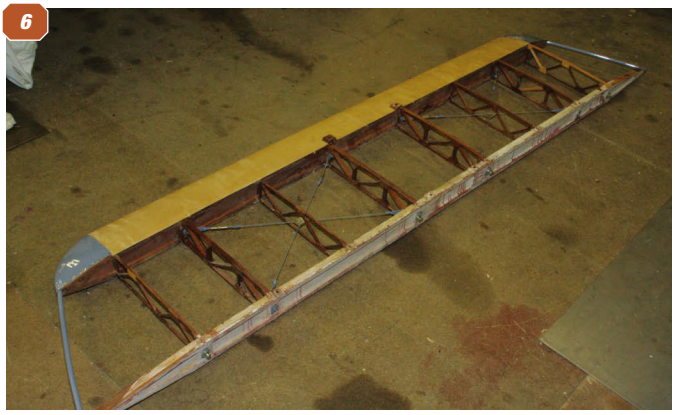
3: Close up of the restored tailplane, much of it restored original.

4: Original wing panel, tucked away pending completion of other work.

5: Fin and rudder assembly; original, after restoration.



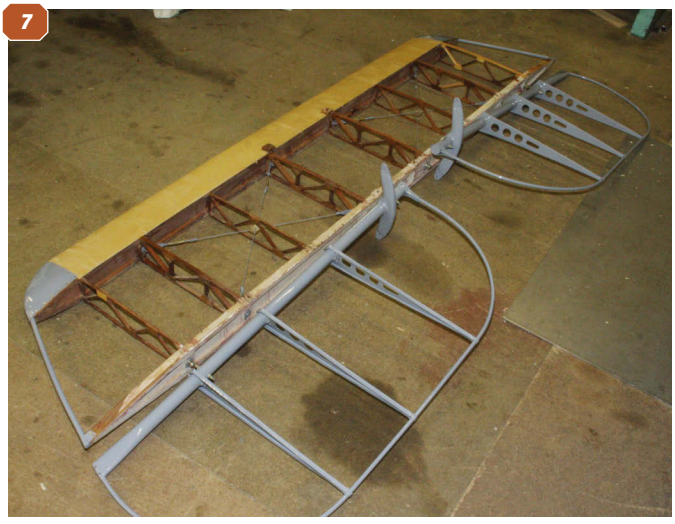




6: The complete, fully restored tailplane unit, ready for covering

7: Tailplane and elevators are all the originals, on which restoration is complete.

8: Awaiting restortion, the wing centre section, showing the ribs that cradle the gravity-feed fuel tank.



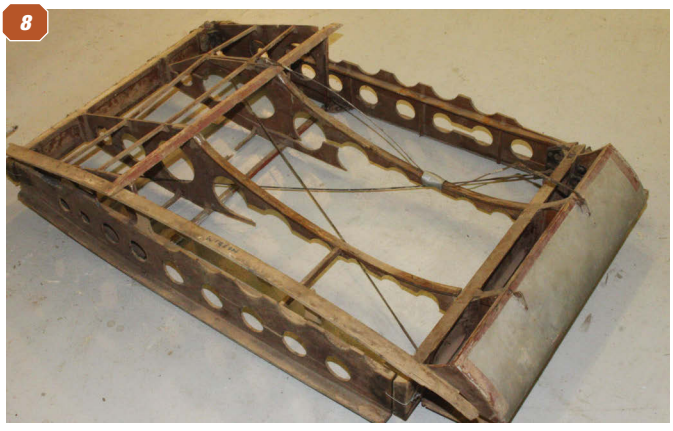
9: Westland works construction number on one of the spars.

10: One of the fully restored full-span ailerons.

11 & 12: Work-in-progress on one of the wing struts.

13: Original cockpit instrument panel.

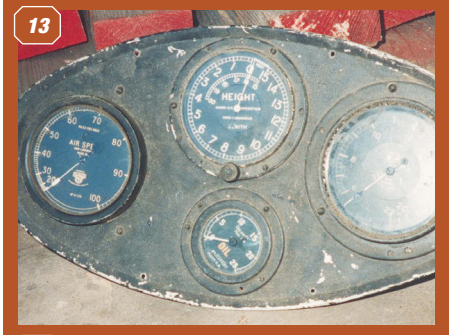
14: Straight from the delivery container - the basic fuselage, as delivered from Australia.

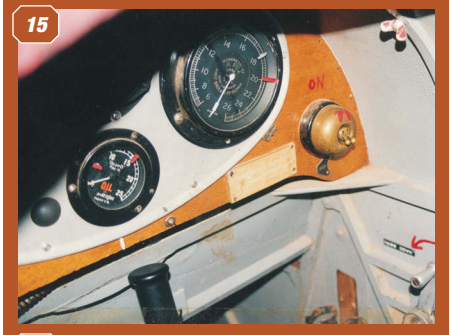


15: Inside one of the two cockpits.

16: Main undercarraige wheel and legs.

17: Bare bones of the rear cockpit position, showing some of the basic metal fuselage construction.





WIDEON PROGRESS

By early 2013, the AeroAntiques team had made substantial progress on their Westland Wideon restoration, destined to be re-registered at G-EUKS. The major progress had, at that stage, been on the fuselage and tail surfaces, while the wing structures were well advanced but still uncovered. All achieved in the tight confines of AA's Hall Farm restoration workshop.

WESTLAND WIDGEON

Ever popular with scale modellers, the Widgeon might have been one of the 'mainstream' club/private aircraft of its era, had not the lure of military contracts intervened

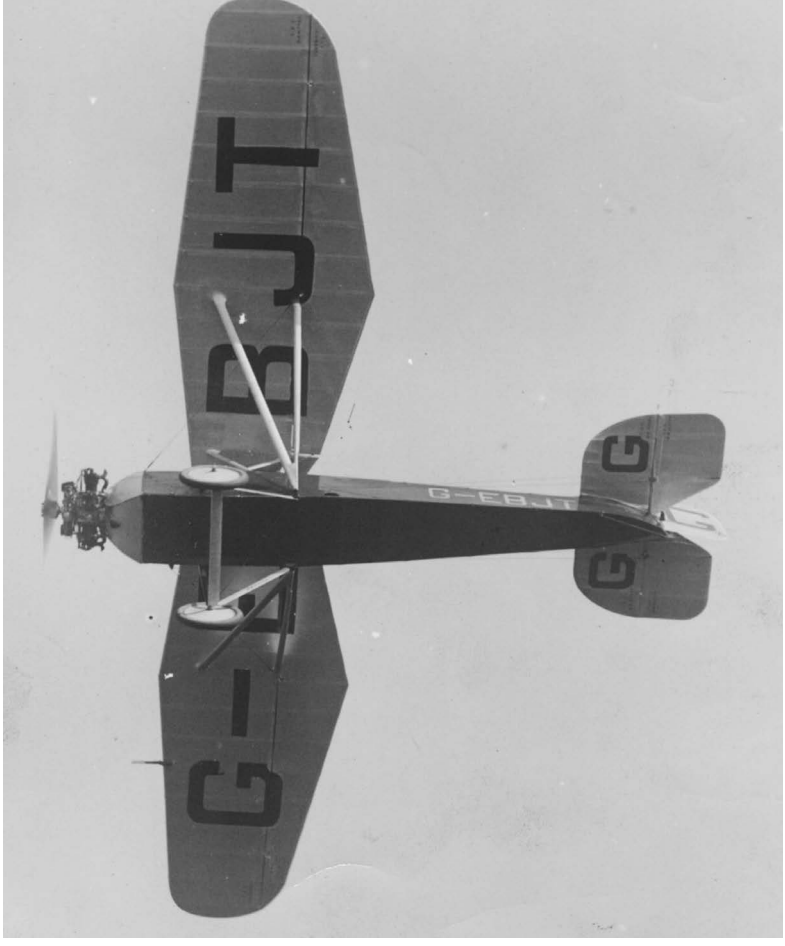
WITH PHOTOS FROM THE RICHARD RIDING COLLECTION

In 1924, the UK Air Ministry sponsored a competition for a two seat ultralight aircraft, that had to be powered by an engine of 1,100 cc displacement or less and capable of carrying a load of at least 340 lb (155 kg). The objective was to encourage the development of cheap civil aircraft suitable for use by private owners and flying clubs.

Among the responses, Westland Aircraft produced two designs, the Woodpigeon biplane and the Widgeon parasol monoplane, and built prototypes for both. Of these, two examples of the Woodpigeon were the first to fly, followed, eight days later by the Widgeon on 22 September 1924. The fuselages of the two types were very similar, with of mixed steel tube and wooden construction, while the Widgeon's wooden parasol wing, tapered in both chord and thickness, folded for easy storage. The Widgeon was powered by a 1,090 cc Blackburn Thrush three-cylinder radial engine, that delivered 35 hp.

The Air Ministry Light Aircraft competition commenced at Lympne aerodrome, Kent on 27 September 1924. Both Westland types entered were badly underpowered using the Thrush engine and the Widgeon crashed during the first day of trials. Despite this setback, it was clear that the Widgeon had promise and was superior to the Woodpigeon, so the damaged prototype was rebuilt with a more powerful 60 hp Armstrong Siddeley Genet engine as the Widgeon II. Despite its

The Cirrus Mk II-powered Widgeon III G-EBRL was registered to Westland MD Robert Bruce in May 1927 and flew as a company demonstrator. It was flown into 2nd place in the 1927 King's Cup and in 1929.



ABOVE, LEFT & BELOW: **Three views of the Widgeon prototype, first registered in 1926 as the sole Mk 1 powered by a 35 hp Blackburne Thrush. Hugely underpowered the prototype crashed at the 1924 Lympne Trials and was rebuilt as Mk II G-EBJT, re-engined with a 60 hp Armstrong Siddeley Genet. Note the thick lozenge-shaped parasol wing, a shape that was to reappear in the company's Lysander in 1936. G-EBJT was sold to Dr E. D. Whitehead Reid who used it on his rounds until he crashed into trees in poor light at East Sutton Park, Kent in October 1930.**

The yet unmarked prototype Widgeon Mk IIIA introduced in 1929 was Mk III G-EBRM rebuilt with Duralumin metal fuselage and control surfaces, new split-axle undercarriage and a 105 hp Hermes replacing the original Cirrus III engine.

Widgeon IIIA G-AAGH remained with Westland all its life (1930-48) serving as a communications aircraft and post war it was memorably flown by Westland chief test pilot whose party piece was honking an ancient car horn whilst crazy flying. The last Widgeon built it was powered by a 105 hp Hermes I engine. *(E.J. Riding photograph).*

The Cirrus Mk II-powered Widgeon III G-EBRL was later fitted with floats by Saunders of East Cowes. 'RL was lost in a crash when test pilot Louis Paget was demonstrating low-level spins at Yeovil to impress visiting schoolboys. He broke both legs and his test flying days were over.

Widgeon III G-EBRQ was registered in July 1927 and was fitted with a five cylinder Armstrong Siddeley Genet radial engine. During 1928-29 owner Sqn Ldr 'Daddy' Probyn made a 4,200 mile tour, taking in Pisa, Tunis, Oran, Madrid and Biarritz. 'RQ was withdrawn from use at Hinaidi, Iraq in January 1936.

Widgeon G-EBRM in its original form, with wooden fuselage and Cirrus III engine. When it was converted to become the first Mk IIIA it emerged with a metal fuselage and flying surfaces and sported a wide divided undercarriage; a Hermes I replacing the original Cirrus III engine. After spending its last years with the Brooklands School of Flying it was scrapped there in 1931.

Westland Widgeon III G-EBRM in its original form, with wooden fuselage, Cirrus III and original undercarriage.

Westland's Chief Test Pilot Harald Penrose taking Widgeon IIIA G-AAGH out for an airing from Yeovil on April 16 1946. This, the last British survivor, crashed and burned after a pilotless take-off from Merryfield, Somerset on 27 July 1948. *(PHOTO: E.J. Riding)*

VARIANTS

Widgeon I: Powered by one 35 hp Blackburn Thrush radial engine. One built.

Widgeon II: Rebuild of Widgeon I with 60 hp Armstrong Siddeley Genet radial.

Widgeon III: Redesign for production. Powered by ADC Cirrus II or III inline engine, Genet II radial, ABC Hornet or de Havilland Gipsy. 18 built

Widgeon IIIA: Variant of Widgeon III with metal fuselage and revised undercarriage. Powered by Cirrus or Gipsy engine. Seven built.

much greater weight, the new engine transformed the Widgeon, the rebuilt aircraft being almost 40 mph faster.

Based on this improved performance, Westland decided to put the Widgeon into production for private owners, but not before redesigning the wing with a simpler, constant chord shape in order to ease production. The resulting Widgeon III was offered with a choice of either a radial engine like the Genet or an inline engine such as the Cirrus and the first Widgeon III flew in March 1927, with production starting later that year. The design was further refined with a duralumin tube fuselage and a new undercarriage to produce the Widgeon IIIA.

The Widgeon proved expensive compared to its competitors and a total of only 26 of all types, including the prototype, were built and sold before production ceased in 1930 in order to allow Westland to concentrate of the Wapiti general-purpose military aircraft and the Wessex airliner. ■

The Gipsy I engined Widgeon III G-AADE displaying its fully opened leading edge slats prior to a perfect three-pointer. It crashed at Beaulieu, Hampshire in July 1932.

AeroDetail series

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A study of the example hung in the Fantasy of Flight Museum, finished in RAF WW2 colours. (35 images)

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The spectacular, stylish aerobatic biplane revealed in close-up. Example shown is the two-seat version. (90 images)

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Late 1940s civil light aircraft with distinctive twin fins and nosewheel type undercarriage. A fully restored example. (123 images)

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Original upright engined version of this diminutive British low wing sports/racer. (90 images)

Chance Vought F4U-1D Corsair CD30
The famous 'bent wing bird' in super detail. (132 images)

Bucker Jungmeister CD29
Radial engine version. Example from Fantasy of Flight Museum. (79 images)

Bucker Bestmann CD28
Authentic example as exhibited at the Fantasy of Flight Museum, in WW2 Luftwaffe colour scheme. (43 images)

Bristol M.1C CD27
Early WW1 fighter monoplane. Example depicted is the faithfully authentic replica built by the Northern Aero Works and operated by the Shuttleworth Trust museum. (100 images)

Bristol F2B Brisfit CD26
Full close-up detail, including photos of engine cowls for both Rolls Royce Falcon and Hispano-Suiza engines. (28 images)

Bristol Bulldog CD25
This collection depicts the example assembled from two donor airframes and restored to superb standard by Skysport Engineering. It can now be seen at the Royal Air Force museum, Hendon. (60 images)

Boeing Pt-13/17 Stearman CD24
Subject aircraft is a current British civil register example used for air-show displays. (54 images)

Bleriot Monoplane CD23
The Shuttleworth Museum's machine, the oldest original example still flying. Much close-up detail showing all the exposed rigging, structure and the "bedstead" main undercarriage, plus Anzani engine. (74 images)

Bell P-39Q Airacobra CD22
Superbly restored example of this much-maligned WW2 fighter aircraft that was used with great success by Russian forces in the ground attack role and with saw much action in the south Pacific, from where this restored example was recovered. (130 images)

Beech D18 Staggerwing CD21
The distinctive back-staggered 1930s biplane with retracting undercarriage. (45 images)

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The Shuttleworth Museum's superbly maintained machine, in full detail. (140 images)

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On Silent Wings with Chris Williams

SCALE SOARING

One thing I have noticed, as the years stack up behind me, is that I find myself less and less willing to venture out in conditions that verge on the inclement. The forecast for the Ghost Squadron Aerotow weekend , June 10-11th at Middle Wallop, Wiltshire, promised hurricane force winds on the Saturday, but they would be downgraded to the status of a mere tropical storm on the Sunday. So, after a brief consultation with the gang, we decided that the Sunday would be the favourite. As it turned out, it was a tad windy, but that didn't stop a full day of very satisfactory flying.

For what seems like several geological ages now, Barry Atkinson has been constructing a 1:3 version of the Slingsby Swallow. When questioned as to its progress, he would reply *"...nearly ready now..."*, but would continue flying his diminutive K8. The model is based upon the free plan on the SSUK website, although heavily modified. Imagine my surprise, then, when I learnt that he had maidened it the previous day in all that wind. He went on fly it again, and finally it was possible to get her in front of the Scale Soaring column's camera.

Bill Cooke's Topaze (Traplet plan MW3578) has been around for a while now, but having been embellished, paint-wise, over the winter months, it just goes to show how important the colour scheme is on a glider, as Bill's model certainly looks pretty, going on to perform well in the windy conditions.

You might have been excused for thinking you were at a jet meet at times during the day, as Andy Schafer's ASW27 performed aerobatics over the airfield. In fact, the motive power comes from an electric ducted fan, showing how far the arena of electric power has progressed.

But the main excitement of the day came when Geoff Pearce's bright green Pilatus B4 developed a stalled elevator servo. Fortunately is was stuck in the up, rather then the down position, and the transmitter was hastily handed to bossman John Greenfield, who managed to kill the model's phugoid gyrations and bring her

Barry Atkinson with his new 1/3rd scale Slingsby Swallow.

The Wolf in action at White Sheet. (Photo: Barry Cole)

Bill Cooke's 1: 3.5 scale Topaze.

safely back to earth with the judicious use of the airbrakes.

It was definitely a busy day at the Middle Wallop site: to one side of us there was a SAM 35 meeting, and to the other the home club were operating, too...who says we don't put our country's assets to good use!

Despite the strength of the wind, the flying was surprisingly good, and on the home front I was able to bring out my big Habicht for its annual airing, and also the Steinadler for it's first flights with the new Taranis transmitter.

Not a classic Ghost Squadron event, but a good time had by all the attendees: perhaps the weather will be kinder next time around...?

SMALLER IS BETTER...SURELY NOT...?

As reported a few issues back, my flying compadre Barrington V. Smallpiece built himself a tiny 72" semi-scale Slingsby Skylark from the *West Wings* kit. Now, I seem to remember that as a lad, a 72" model was pretty darned big, but ever since my intro into scale gliding, back when Fred Flintstone was in short trousers, I have operated on the mantra that bigger flies better. I couldn't help but notice, though, that the lad seemed to be having rather more than his fair share of fun with the Skylark, and I filed this observation away for further thought.

Then, cunning fiend that he is, he fitted a gizmo in the back of my tranny, and made me tow his Skylark up with his little foamie Wot 4. Once again, the whole operation seemed more fun-filled than it could possibly deserve. The outcome of all this was that I decided to build a 'proper' scale glider down at this diminutive scale, just to prove that it couldn't be done. The subject of choice was the Goppingen Wolf, designed to be a competitor to the more well-known Grunau Baby. (The firm went on to produce the GO 3, the rather more famous Minimoa)

The main obvious visual difference lies in the lobate shape of the ailerons, and seemed to me that a positive lateral control might be a good thing at this size. Construction commenced in a rather lack-lustre fashion, as I thought the outcome would be less than ideal, but I persevered, producing a model with pretty much the same construction methods as my larger creations, spruce, liteply and balsa being the main components. The main challenge was to keep the weight down, not usually a preoccupation with the larger models, and to this end, the Wolf has a one-piece wing, thus cutting out the weight of a wing joiner system. The airframe was covered with film, another weight saver, and to my eyes at least, the finished product looked pretty attractive. Smallpiece's Skylark weighs in at 27ozs (or so he says) and I was pretty close to this weight until I had to add about 10ozs of ballast to get the correct CG. So, would the poor little Wot 4 cope with all that extra weight.

The miserable flying weather we have experienced so far this year put a cramp on getting the maiden in, but finally, one evening, the wind deigned to blow in moderate proportions on a nearby slope, and off we went to see what was what. Just like when I was a lad, a hand launch over the long grass was in order, and this is what I did. A determined dive for the deck was the result

Evocative nose art on this Terry Holland-built 3rd scale Cherokee.

E-Assist on steroids! Andy Schafer's ducted fan ASW27F.

The Slingsby Swallow in action.

Traditional construction on the Wolf's airframe.

Author with the completed Go 1 Goppingen Wolf.

and some full military elevator was required to prevent premature-terra-firma-convergence syndrome.

The flight then continued in a very jerky style, with super sensitive ailerons and a very touchy elevator. But here's the important thing...she kept on flying to the point that if I didn't do something, she would keep going out away from the slope, and my nerves weren't up to that! Devoid of any sort of spoiler or brake system, the model relies on the ailerons coming up to increase the rate of descent, and this is precisely what happened.

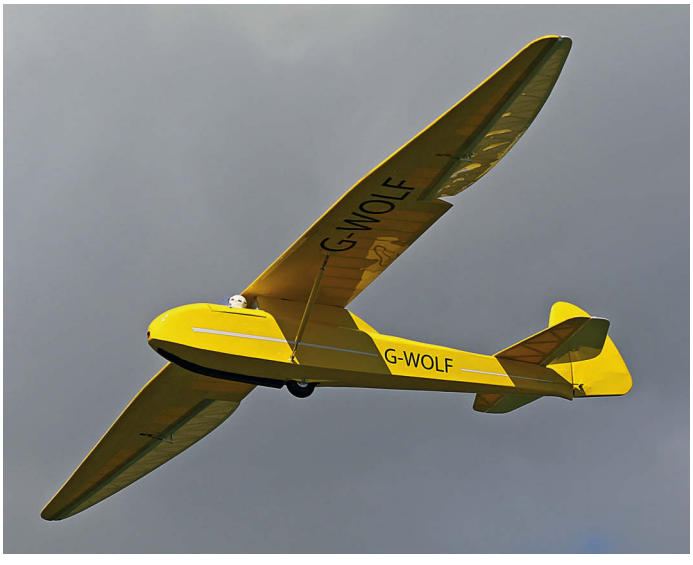
A few more chucks and some messing about with the transmitter took out most of the jerkiness, and then it was time to fly out into the void. Conditions were not of the greatest, with bumpy air and unreliable lift, but it soon became obvious that the Wolf had absolutely no vices whatsoever, something I would have thought unthinkable with a small model.

Fast-forward a few days and we find ourselves at our local flat field power club, with the Wolf hooked up behind the trusty Wot 4. Several tows later it became obvious that the tug was perfectly up to the job, that the glider was perfectly happy on tow and, had she bumped into a thermal, would have happily stayed aloft.

Fast-forward again now to a Sunday at White Sheet hill, with a robust wind gusting at 24mph. With the ailerons in the landing position, full up elevator can be applied without any sign of a wing drop. It was therefore perfectly possible to fly backwards in the strong wind! Aerobatics were next, the full size being fully stressed for such behaviour. Loops, rolls, spins, chandelles etc. proved possible, but the real test came when the Mobius camera was hung on the airframe in various positions, which fazed the model not at all.

Came the end of the day and the final flight had to be abandoned as the receiver battery had gone flat, which brought about the realisation that my larger models had spent most of the day on the ground.

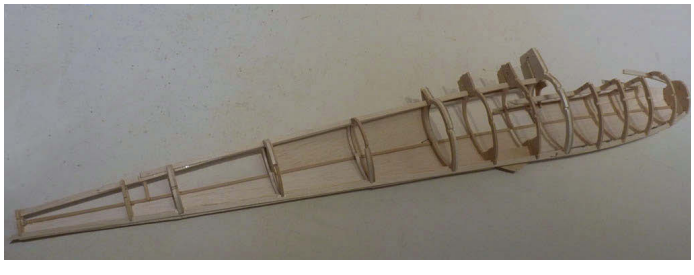
So, smaller is better...? Not in realistic



More action (Barry Cole pic).

Perfectly matched pair: the Wolf & the Wot 4.

Towing action (Geoff Crew pic).



The Slingsby Gull 4 takes shape.

The Wolf inverted with the Mobius camera on the tailplane.

flight terms it's true, but the enjoyment factor is just as high...

NEXT ON THE WORKBENCH

Buoyed up by the success of the Wolf, I am now heavily engaged in the construction of similarly-sized Slingsby Gull 4. The Gull's fuselage shares the same frames as the Kite 2, of which I recently built a 1:3.25 version. What, I wondered, if I were to scale down my CAD plan for this model, as the design of the fuselage formers is usually the hardest part of any design. It seemed to work out, so now I look forward to the culmination of this project with a lot more optimism than when I started the last one...! ■

c_williams30@sky.com

LOUVRES FRON

THE PHILLIP S. KENT APPROACH TO ONE ELEMENT OF SURFACE DETAIL

One of my past scale projects was a quarter scale Aeronca C3 Razorback, a simple aircraft one might think, but one with lots of character from the 'Golden Age' of aviation. Originally, the model was designed for an O.S. Gemini 120 flat twin, but when I found that it was impossible to hide the carburettor and also that the model engine bore little resemblance to the full size engine, modifications were made so that a Laser 120 could be used.

Due to the model appearing to be rather plain and having simple lines it was important, I thought, to incorporate as much accurate surface detail as possible. The cowl was one area where this could be done, as there were latches and louvers that were very prominent.

I have made louvers in the past by punching them out of the cowl material following full size practice, using a punch-and-die and by making individual louvers from card or litho plate. My first thoughts were to make the ones for the Aeronca individually as they were bigger than my old punch and die. So I made a mock-up louver from litho plate that had to be attached to a flat backing plate. The plate then had to be cut out to the louver shape and then attached to the cowl. It was soon obvious, as I worked on these louvers, that they would need a lot of work in the form of filing and shaping to get them to look anything like the ones on the real

The Alexander Bullet in a fictitious colour scheme should be dark green and silver, showing the engine cowl louvres.

M LITHOPLATE

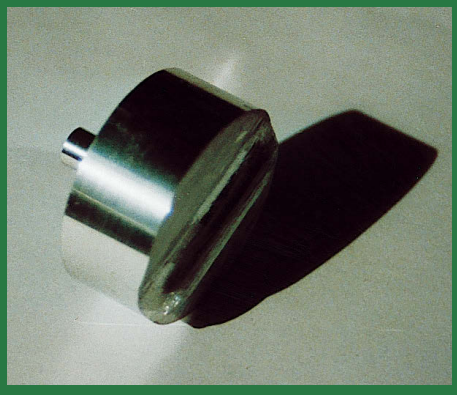
aircraft.

At that point, I decided to look at the alternatives. The obvious choice was to go back to my original idea of a few years earlier and punch out the louvers. I had used this method on a model of my Alexander Bullet that had lots of small louvers in the cowling. That model was quite small, it had a span of 65 inches and the louvers were in runs of seven or eight. But I did not have a fly press and I had to think of another way to do the punching.

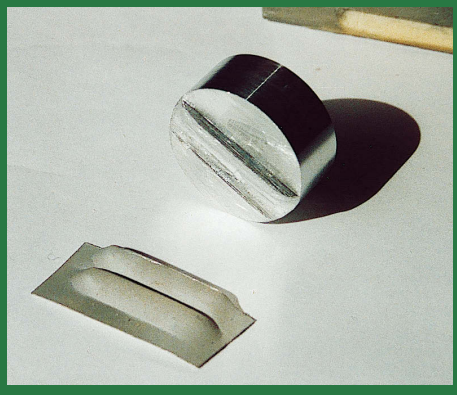
I eventually decided that my small pillar drill might do the job and tests were carried out with this object in view. There were two slight problems here, the drill chuck was free to rotate, so how could I hold the litho plate when punching? There was also the greater problem of making the punch and die. The material that was to be punched was thin, soft, litho plate and I reasoned that it would be much easier to make a punch and die from aluminium as I didn't have any machining facilities and I was going to have to make them both by hand using a hacksaw and files.

As things turned out, this wasn't too bad. I made the punch from 7/8-inch diameter aluminium bar and the die from aluminium angle. To stop the drill shaft rotating, I lashed a piece of thick strip balsa to the chuck so that it remained in contact with the pillar on the drill. This worked very well and I was able to produce all the louvered panels needed for the Bullet; see photos, using the drill press and a simple fixture that

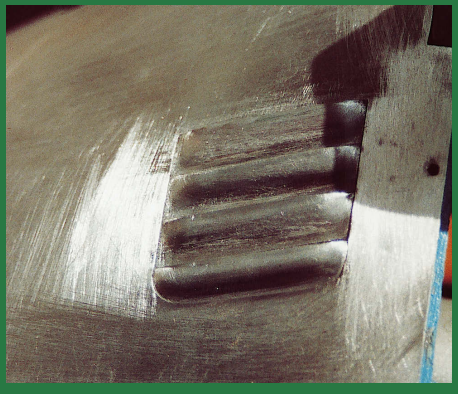
The original punch used for the louvers on the Alexander Bullet.



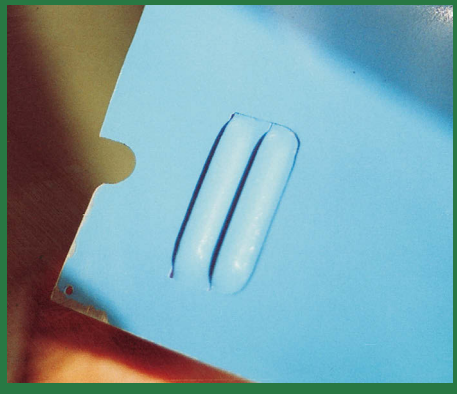
The punch for the Aeronca louvers.



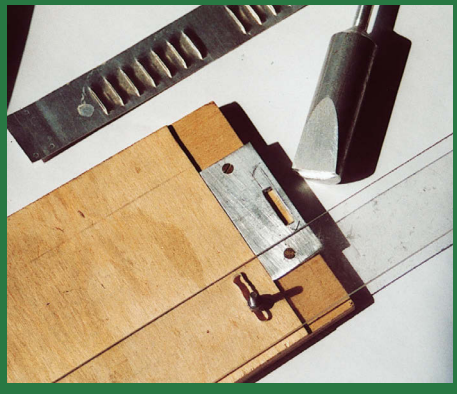
Another view of the punch with the die and a couple of sample louvers.



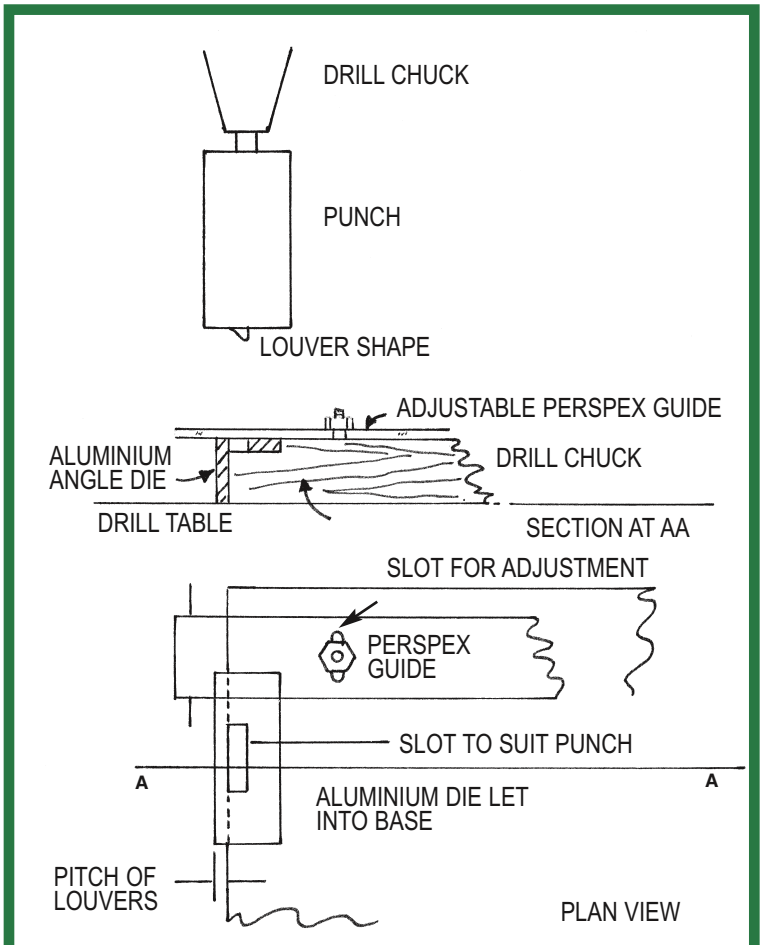
A bank of four louvers on the Aeronca lower cowl.



The twin louvers on the upper Aeronca cowl.



A strip of louvers for the Alexander Bullet with the punch and die.



allowed me to produce a series of punched louvers cut straight or at an angle.

For the Aeronca C3, I needed to make a new punch and die, as the louvers were a lot bigger. This time I used 1.3/8" diameter aluminium bar for the punch and I used a piece of steel angle for the die. Due to the increase in size, I did experienced some problems at first, when punching, but after deciding to make one louver at a time I overcame the problem.

The louvers in the lower cowl are in sets of four, two on each side of the cowling. In the upper cowl, the louvers sets are made up of two individual louvers again with one each side. According to my photographs of the full size aircraft, the louvers were a separate item and were not

Two good examples of metal louvres punched into lito plate as decribed here by the author.

punched into the cowl panels. It seemed reasonable to do the same with the model and in fact it made things a lot easier since they could be made one at a time.

In order get an accurate positioning and an accurate size for the louvers, I had a photograph of the nose section of the aircraft enlarged to the correct scale of the model. It was then possible to fix the position of the louvers and work out the correct sizes for the punch and die. After some preliminary punching that was not too successful, I decided that I might get a better-shaped louver if I made the die to the louver outside shape rather than just a slot in the plate. I did this by filling the slot with a mixture of micro balloons and epoxy. I then ground out the louver shape with my Dremel tool, fitted with various grinding tools. The resulting louvers were much better and with a little work, became quite acceptable. It had also made things much easier making them one at a time rather than in the banks of two and four. When glued in place it is impossible to see that they were not produced in sets. The photographs give an idea of the quality and accuracy of the louvers for the Aeronca. ■

The author's latest creation quarter-scale Aeronca C.1 monoplane is another with engine cooling louvres applied using the method described here. We hope to present the model as a construction feature in a coming issue of FSM.

THE QUIET ZONE

R/C SCALE ELECTRICS WITH PETER RAKE

PETER RAKE CONTINUES HIS DISCOURSE ON SOME OF THE BASICS OF THE ELECTRIC POWER-TRAIN, THE IMPORTANCE OF MATCHING THE INDIVIDUAL COMPONENTS, WITH SPECIAL EMPHASIS ON LIPO BATTERY CARE

Here we are again, back with another thrilling instalment of your favourite electric flight column. Well it's my favourite at any rate. With that established, let's see where we left things last month.

Once again I have to apologise to all the experienced electric fliers because this month we'll be continuing the 'back to basics' article started last time. As regular readers will know, once I start to ramble on about a specific subject I invariably run out of space and have to carry it over to the next issue. This, as you may have guessed, is no exception. So, read it, ignore it or simply laugh at it, I don't mind which. This one is strictly for the novice electrolytes out there who are desperate enough to find this helpful.

BEFORE GOING FURTHER...

Before I get into specifics I thought it might be worth mentioning the basic principle that all my models are set up using. Basically, that means never use the absolute minimum to do the job, always leave the biggest margin of safety you can manage within your chosen system.

Now, I'm not taking about motors here. Despite what some will tell you, you definitely can have too much power. Remember what I said last time about required power levels and stick to that. Having a large excess of power available will only succeed in making your life more

Requiring minimal power, this is the model with the 30 minute plus flight times on a 2000 mAh pack.

TOP LEFT: Costing about £100 and bought for a specific model this pack hasn't been used since. Why I don't buy high tech packs any more. TOP RIGHT: Sometimes it's more convenient to use two single cells wired in series than a 2S pack. Capable of 40 amp draw but fitted to a model only drawing 20 amps. ABOVE LEFT: A typical helicopter pack. Note the quoted C rating clearly shown, ample for most small models. ABOVE RIGHT: Two very similar packs, but notice the more rounded appearance of one. This puffy pack is destined for the bin.

complicated, and making the overall cost of your set-up that much higher. Why is it more expensive? Well, if the motor is hugely more powerful than you need it will pull a lot more amps. If it's pulling more amps, you'll need a higher rated speed controller and a battery pack that can cope with what the motor wants to take out of it. Since you are unlikely to be able to get a bigger (physically bigger) pack into the model, you'll need cells with a higher C-rating than would otherwise be the case. I'll deal with that in greater detail once we get onto batteries, but basically the higher the C-rating of the cells, the more expensive the pack will be.

What I mean by having 'a good safety margin available', is not to use the very minimum capability of either the speed controller (nothing to do with fat controllers) or the battery pack. Doing either, or possibly (slap your wrist) both is a sure route to disaster unless you know exactly what you're doing.

Use an ESC with a much higher amp rating than your motor will ever pull. As I said last time, that rating only refers to the MAXIMUM it can handle, not what it has to be run at. Doing this will mean that the ESC never gets stressed, which means it won't get too hot and is highly unlikely to fail. As you can probably imagine, an ESC that fails in flight because it was over stressed by the motor, almost guarantees that you'll need a new model. New model, new ESC and probably new motor and battery pack too. Hardly worth the risk, is it?

Why opt for a battery pack with far more capacity than you'd expect? You'll need to do a few sums along the line but I'll try to explain my thinking on this point

Imagine, for the sake of simplicity, that your motor will be pulling 20 amps. Therefore you'll need a battery pack that can supply that sort of current. That factor is determined by the C-rating of the pack. All that means is the number of times the pack capacity (C) it can put out without going into self-destruct mode. Believe me, you never want to witness a LiPo pack self-destruct, especially not in your house. They burn quite ferociously and the fire is difficult to extinguish.

So, getting back to what I was supposed to be talking about, C ratings and current draw. To cope with the 20 amps the motor is pulling, you could buy a 500mAh pack with a 40C rating, but that's pricey and would give extremely limited flight times - less than three minutes. However, as long as you can fit it into the model, a 2,000mAh pack of 10C cells will do exactly the same job but be cheaper and quadruple the potential flight time.

I know neither of those examples actually allows any safety margin and were only used to keep the figures simple. A much more realistic arrangement, and still probably cheaper than the tiny 40C pack, would be a 2,000mAh pack of 15C rated cells which would, at 30 amp capability, be more than enough for our needs. Yes, of course there's nothing preventing you using the higher specification cells, they'll certainly give you a good margin of safety, but you don't absolutely need them (or the extra cost) for safe flying. They'll probably prove more versatile should you decide you like electric flight, but may tip the balance, cost-wise, when you're trying to decide how much you're prepared to spend to give it a try. As I say, always go for the highest capacity cells you can comfortably fit into the model.

Carrying the theme a little further, let's take another look at that Eastbourne Monoplane model I mentioned last time. The motor on that model was capable of pulling a bit in excess of 10 amps on a two-cell battery. I say 'capable of', but never actually required to run that hard. Since there was plenty of room in the fuselage, and the model needed nose weight, I fitted a 2,000mAh pack of 12C rated cells. So, even if run at maximum power, the motor would only be pulling 10 amps, although the battery pack was capable of supplying up to 24 amps - a more than fair margin of safety. Since, in reality, the motor spent most of its time at around half throttle, I could easily get 30 minute flights without coming even close to stressing anything, or running the pack low enough to risk damaging the cells.

BACK ON TRACK

Okay then, with a bit of rambling out of the way while I described my method of setting up models, a method I might add that has never caused me to kill a battery pack in over 20 years of electric flight, but let's get back to what we were supposed to be discussing; batteries, the final part of the airborne power system.

As we've already mentioned, LiPo cells

An after market 2 or 3 cell helicopter balance charger with lights to indicate the charge of individual cells within the pack.

The more common type of heli charger with just power and charge lights. Still a balance charger though.

are a nominal 3.7 volts each (fully charged they're at closer to 4.1 volts but that doesn't last long enough to worry about). Such cells come in various capacities and can be as high tech, or low tech as you want to make them. The latter refers to internal technology, not how complicated they are - that damn C-rating business again.

To make up the required voltage, the packs are made up of single cells wired in series, usually listed as 2S, 3S etc. Sometimes, to keep a pack more compact, you'll also see something along the lines of 3S2P. All that indicates is that such a particular pack is made up from two 3-cell packs wired together in parallel - voltage remains the same as the 3-cell pack, but capacity is doubled.

There isn't really very much to say about how they work, simply because there's no practical reason you'd need to know that; just suffice it to say that they do work, and work very reliably as long as you follow a few simple rules.

I'm sure you'll have heard the horror stories about LiPo packs spontaneously bursting into flames. I know it can happen, but generally there's a specific reason for it happening. In all the time I've been flying LiPo powered models, probably ten years or so, I've never had such an occurrence. If you follow what I said about never stressing the pack, either in use or during charging, you shouldn't have any problems.

So, what is likely to cause issues with your LiPo cells that might kill them off, without actually igniting the pack. First and foremost, and probably the main cause of battery fires, is a damaged cell. Under the heat-shrink cover, the cells themselves are contained by nothing more than what can only be described as more heat-shrink - metallic coloured heat-shrink yes, but heat-shrink nonetheless. Catch that hard on something sharp and you have a leaking cell; a severely damaged cell, in fact. NEVER attempt to charge a damaged cell, or a pack that you suspect has a damaged cell.

A friend of mine failed to notice that the extra long hatch screw he'd fitted had punctured one of his cells and proceeded to charge the pack in his model. That model is now junk because the nose is burned up quite badly -£60 motor and all. The moral of the story is to check your packs on a regular basis, and especially if the model has suffered something of an arrival. Damage shouldn't be too difficult to spot and that pack discarded.

Another thing sure to doom a pack to the rubbish bin is to over-discharge it, or simply leave it uncharged for a long time. The usual sign of this as that one or more cell has taken on a puffy looking appearance. Excessive discharge rate on a pack will have much the same effect, so remember what was said earlier about safety margins. Charging too fast can also result in this. Puffy cells in a pack are another sign that a pack isn't truly safe to charge.

To avoid (as best we can) ballooning battery syndrome, never store your packs fully discharged (as at the end of a flight), but charge them to at least 2/3 capacity after you return from a flying session and top them up occasionally. They'll hold charge for quite some time, so once every couple of months should do the job.

Bear in mind what was said last time about having the correct settings on your speed controller - if using a 3S pack, make sure the low the ESC isn't set up for 2S operation. Taking the voltage per cell below the recommended level is another good way to inflate your pack. Inflated tyres are good, inflated LiPo packs are definitely not good. Conversely, if you have bought an all-singing, all-dancing charger, make absolutely sure that it doesn't mistake an almost charged 2S pack for a discharged 3S; an attempt to pump 11.1 volts into a pack that should only be 7.4 volts is a recipe for disaster. Not only will the cells puff up, but it is also highly likely to burst into flames too.

DON'T PANIC

Yes, I know all that sounds a bit daunting, but I needed you to be aware of things to watch out for when using LiPo batteries. I've been using them for ages and, apart from the odd puffy cell as a pack gets past its prime, I have never had any problems. Treat your cells gently and they will repay your kindness by providing a trouble free source of power for your models to punch holes in the sky.

By treating them gently I just mean never charge them too fast, make sure never to run them down to voltage cut-off level and absolutely never attempt to put any stress on them in flight (that safety margin) again.

Even cheap packs are now sufficiently safe that you shouldn't have problems with them, but ONLY if you're actually choosing the type of high discharge cells intended for model use. The ones for electrical appliances (phones, computers, etc.) have nowhere near the C-capability you'll need. Avoid them like the plague, no matter how cheap they may appear to be. It's all common sense really.

I've found the type of cells we use so reliable that, apart from the very first time I charge a new pack, I mount my packs in the model and charge them in situ. It's never given me any problems and I find it safer as regards damaged packs; after all, if the pack can't move in the model, there's very little chance of it getting damaged in a less than perfect landing (as opposed to a seriously catastrophic 'arrival' of course.

> ***"Yes, I know all that sounds a bit daunting, but I needed you to be aware of things to watch out for when using LiPo batteries. I've been using them for ages and, apart from the odd puffy cell as a pack gets past its prime, I have never had any problems"***

As for that first charge I mentioned, I do that outdoors so that if anything untoward is going to happen, it won't cause any real damage. I'll be able to see what's happening, check the pack isn't getting hot as it charges and general make sure that all is as it should be. If all is well after a charge/discharge/recharge cycle I feel confident of all being well once the pack is in the model - baring, of course, over-length hatch retaining screws.

CHARGERS

There are a vast array of chargers available, but you absolutely have to be sure they are LiPo chargers. The older, peak-detect chargers you may see advertised aren't designed for LiPo cells. They don't exhibit that 'peak' drop, so the charger will just keep pumping in the power - not a good thing at all.

As regards true LiPo chargers, anything from a simple ex-helicopter unit through to the all singing, all dancing type mentioned earlier, are viable options. Personally, I use ex-helicopter chargers for my small packs (under 1,200 mAh) and a programmable charger for anything larger. Since most of my packs are of lower technical spec, (yes, I'm a mean beggar) I never charge at anything more than 1C. The heli chargers don't usually charge that fast anyway and the programmable charger can be set selecting both voltage and capacity (charge rate). It has a read-out that monitors the charge while it's taking place, so you may notice that it's charging at less than the rate you've selected. That's because it's monitoring the condition of the cell and compensating for that. This is not a balance charger but has served me well for many years.

Balance chargers monitor each cell in the pack and will charge them to as close as it can get to the same level. Therefore, you may well notice that one cell has stopped charging (the LED has gone out) before the other(s). Ex-heli chargers are usually balance chargers (so they claim) but often aren't sophisticated enough to have individual cell LEDs. Some do, but most just have a charge light that turns green once the charge is complete.

Well, that all got a little more involved with batteries than I'd intended, but it was all necessary information. Until next time, you'll find me at the usual place - PETERRAKE@aol.com ■

No longer anything like this pretty. The model that also appeared last month no longer has a nose thanks to careless battery installation.

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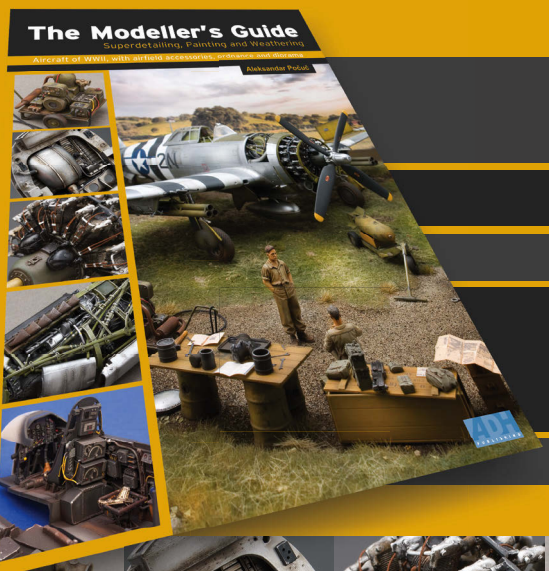

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